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EVERYMAN'S ENCYCLOPAEDIA

FOURTH EDITION

IN TWELVE VOLUMES

VOLUME TWELVE

TAR—ZYRYANOVSK

EDITED BY E. F. BOZMAN, M.A. (*Cantab.*)

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ABBREVIATIONS

The titles of subjects, which are printed first in bold type, have been abbreviated within each article to the initial letter or letters.

ac. , acre(s).	lb. , pound(s).
agric. , agricultural.	l. b. , left bank.
ambas. , ambassador(s).	long. , longitude.
Amer. , American.	m. , mile(s).
anct. , ancient.	manuf. , manufacture.
ann. , annual.	M.E. , Middle English.
arron. , arrondissement.	min. , minute(s).
A.-S. , Anglo-Saxon.	Mod. E. , Modern English.
A.V. , Authorised Version.	m.p.h. , miles per hour.
b. , born.	mrkt tn. , market town.
Biog. Dic. , Biographical Dictionary.	MS. , MSS. , manuscript(s).
bor. , borough.	mt, mts. , mount, mountain(s).
bp. , birthplace.	N. , north; northern.
Brit. , British.	N.T. , New Testament.
c. , about.	O.E. , Old English.
C. , Centigrade.	O.F. , Old French.
cap. , capital.	O.T. , Old Testament.
cent. , century (7th cent.).	oz. , ounce(s).
chem. , chemistry.	par. , parish.
co. , county.	parl. , parliamentary.
com. , commune.	pop. , population.
cub. ft. , cubic feet.	prin. , principal.
d. , died.	prof. , professor.
Dan. , Danish.	prov. , province; provincial.
dept. , department.	pub. , published; publication.
dimin. , diminutive.	q.v. , <i>Lat. quod vide</i> , which see.
dist. , district.	R. , riv. , river.
div. , division.	R.A.F. , Royal Air Force.
E. , east; eastern.	r. b. , right bank.
eccles. , ecclesiastical.	rep. , republic.
ed. , edition; edited.	Rep. of Ireland , Elre.
educ. , educated.	R.N. , Royal Navy.
e.g. , example.	Rom. , Roman.
Ency. Brit. , <i>Encyclopaedia Britannica</i> .	r.p.m. , revolutions per minute.
Eng. , English.	R.V. , Revised Version.
estab. , established; establishment.	S. , south; southern.
fl. , flourished.	sec. , second(s).
Flem. , Flemish.	sev. , several.
fort. tn. , fortified town.	Sp. , Spanish.
Fr. , French.	sp. gr. , specific gravity.
ft. , feet.	sq. m. , square miles.
Ger. , German.	temp. , temperature.
Gk. , Greek.	ter. , territory.
gov. , government.	tn. , town.
Heb. , Hebrew.	trans. , translated; translation.
hist. , history.	trib. , tributary.
horticult. , horticultural.	U.K. , United Kingdom.
h.p. , horse-power.	U.N. , United Nations.
H.Q. , headquarters.	univ. , university.
hr(s) , hour(s).	U.N.O. , United Nations Organisation
in. , inch(es).	urb. , urban.
inhab. , (inhabitant(s)).	U.S.A. , United States of America.
is. , island(s).	vil. , village.
It. , Italian.	vol. , volume.
Jap. , Japanese.	W. , west; western.
jour. , journal.	Wm. , William.
Lat. , Latin.	yd(s) , yard(s).
lat. , latitude.	

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T

Tar, dark brown or blackish viscous liquid obtained as a by-product in the destructive distillation of coal, shale, peat, lignite, or wood, or by the cracking of petroleum hydrocarbons in the presence of hydrogen and carbon monoxide (carburetted-water-gas T.). The prin. kind of T. is coal T. (q.v.). About 9-17 gallons are obtained from a ton of coal, the quantity depending on the source of coal and the type of retort used, e.g. coke oven, continuous vertical retort, horizontal retort, etc. The chief products obtained from coal T. are pitch and creosote oil (85-90 per cent), naphthalene, T. acids (phenol, cresols, and xylenols), and anthracene. From the first 2 main products road T., black varnishes, agric. insecticides, and liquid fuels are made, while the lesser products provide the raw materials for a wide range of important drugs, dyes, explosives, perfumes, and bactericides. Wood T. is mainly obtained from deciduous hard woods; these give a dense charcoal, whereas the pyrolysis of pine, etc., gives a light, softer charcoal, together with turpentine and resins. Wood T. is condensed with the watery distillate termed pyroligneous acid which contains acetic acid, methylalcohol, and acetone. The wood T. separated from the pyroligneous acid is generally distilled in batch pot stills to yield a residue of wood-pitch (or Stockholm pitch as it is often termed, although the term should only be used for the T. or pitch derived from pinewood) and a wood creosote distillate. The creosote (q.v.) finds a use in the preservation of rope, etc.; the pitch is still used for caulking ships. Stockholm T. is also used medicinally in the preparation of ointments for skin diseases. Chemically, wood T. is entirely different from coal T. and affords no important by-products, although the presence of butyric acid, maltol, and acetyl acetate in it has been demonstrated.

See COAL; CREOSOTE; PITCH.

Tar Heel State, see NORTH CAROLINA.

Tara, vil. of co. Meath, Rep. of Ireland, on the Boyne, 6 m. S. of An Uaimh. The Hill of T. (507 ft) was in anc. times the religious, political, and cultural cap. of Ireland; upon its summit are the coronation stone of the anc. kings, and a statue of St. Patrick. It was a royal residence until 560 and national assemblies were held, and in 980 the Dances were overthrown here. Important excavations began, 1952. See S. P. O'Riordain, *Tara*, 1954.

Tara Fern, *Pteridium aquilinum* v. *esculentum*, a variety of Common Bracken, native to the S. hemisphere. Its root stock is eaten by pigs, and when roasted is a favourite food of the aborigines.

Taranaki, dist. in the SW. of the N. Is., New Zealand, with an area of 3732 sq. m. and a pop. of 94,073. Formerly forest-clad, most of the ground has now been cleared and is utilised for stock-raising,

sheep-rearing, and dairy-farming, meat, wool, butter, and cheese being produced. New Plymouth is the cap. and port. It was in the T. dist. in 1860 that war broke out with the Maoris (see NEW ZEALAND, *History*).

Tarantella, Neapolitan dance for 2 people, in 6-8 time, with a gradually increasing speed. It was supposed to be a cure for tarantism (q.v.).

Tarantism, or **Tarantulism**, epidemic dancing mania which spread over Europe in the 13th and 14th cents. and persisted into the 17th cent. The symptoms originated with a great dread of the bite of the tarantula, which was popularly supposed to cause a form of chorea (q.v.), and the cure for it was believed to be dancing.

Taranto: 1. Or **Ionio**, prov. of Italy, in E. Apulia (q.v.). It is the NW. portion of the 'heel' of Italy. There is a long coastal plain on the Gulf of T. (q.v.), and a plateau in the N. The prin. tns include T., Manduria, and Massafra (qq.v.). Area 960 sq. m.; pop. 443,000.

2. (anc. **Tarentum**, q.v.) It. seaport, cap. of the prov. of T., on the Gulf of T., 49 m. SSE. of Bari (q.v.). It was taken by the Normans in 1063, and became a feudal principality subject to the Kingdom of Naples (q.v.). In the harbour on 11 Nov. 1940 the Brit. Fleet Air Arm crippled 3 It. battleships and 2 cruisers (see NAVAL OPERATIONS in SECOND WORLD WAR). The port was taken, from the sea, by Brit. forces on 9 Sept. 1943. T. has an archiepiscopal cathedral (11th-18th cents.), and an anc. castle. It is one of Italy's 4 naval bases, and has oil-refining and oyster and mussel fishing industries. Pop. (com.) 174,200.

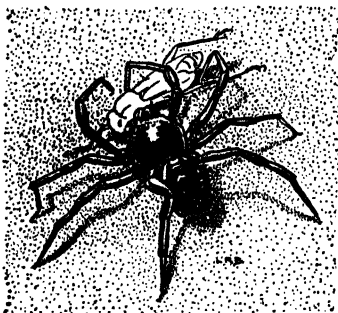
Taranto, Gulf of, inlet of the Ionian Sea (q.v.), separating the 'toe' and 'heel' of Italy. It is bordered by Calabria, Basilicata, and Apulia (qq.v.). The prin. tn on the gulf is T. (q.v.). It is about 60 m. across.

Tarantula, name for various large, formidable-looking spiders, European and Amer., but correctly applied to a few relatively small species of the genus *Lycosa*, found near Taranto in Italy. It is no more poisonous than other spiders of similar size. It burrows in the ground and catches its prey by pouncing on it and not by means of a web. See SPIDER.

Tarapacá, prov. of N. Chile, with Peru to the N. and Bolivia to the E. The Atacama desert dist. nearest the coast has deposits of guano, sulphate of soda, and salt (of which the prin. deposit is the Salar Grande), and copper, silver, and nickel in the mts; gold has also been found. A narrow strip, 3 m. in breadth and 250 m. long, to the eastward contains large deposits of nitrate of soda, whilst eastward again stretches the Pampa of Tamangal to the Andes, the agric. portion of the prov. Alpacas and sheep

are reared. The cap. is the port of Iquique, the other main port being Arica. Area 21,340 sq. m.; pop. 102,789.

Tarare (anc. *Taratrum*), Fr. tn in the dept. of Rhône, on the Turdine. It manufs. muslin, velvet, silk, and plush. Pop. 10,100.



TARANTULA

Tarascon, Fr. tn in the dept of Bouches-du-Rhône, on the Rhône, 50 m. NNW. of Marseilles. There is a splendid castle (15th cent.), a notable church, and a 17th-cent. tn hall. It has a trade in olive-oil and fruit. Pop. 7800.

Tarasius, St. (d. 806), patrician of Constantinople who became patriarch in 784. The second council of Nicaea was held under his initiative. He is much venerated in the Orthodox Church, which observes his feast on 25 Feb.

Tarasp, or *Vulpera-Tarasp*, vil. of Switzerland, in the canton of Grisons, Lower Engadine, 28 m. NE. of St Moritz. It is frequented for its mineral baths.

Tarawa, see GILBERT AND ELLICE ISLANDS.

Tarawera Mt. peak of New Zealand, situated in the Hot Lakes dist. of the N. Is., 90 m. NNW. of Napier. On 10 June 1886 an eruption destroyed the famous pink-and-white terraces of Rotomahana.

Taraxacum, a genus of stemless, herbaceous perennials, family Compositae; there are many species, of which *T. officinale* is the Dandelion (q.v.), and *T. bicorne*, Turkistan, is grown as a source of rubber in Russia.

Tarazona (Rom. *Turiaso*), Sp. tn, in the prov. of Zaragoza, on the Queibes. It has medieval walls and a Gothic cathedral. Mt. Moncayo (q.v.) is near by. Pop. 10,000.

Tarbagatai, mt range in Russian and Chinese Turkestan, extending over 200 m. Its highest point is Muz-tau (11,920 ft), and the best pass is Say-assu, which leads to Chuguchak.

Tarbert, fishing vil. of Argyll, Scotland, 38 m. NNE. of Campbelltown. The vil. lies on an isthmus between E. Loch T.

(inlet of Loch Fyne, 1 m. long) and W. Loch T. (inlet of the Sound of Gigha, 10 m. long). The anc. castle was erected by Robert Bruce, and there is a good harbour. Pop. 2000.

Tarbes (Rom. *Turba*), Fr. tn, cap. of the dept. of Hautes-Pyrénées, on the Adour. It was the cap. of Bigorre (q.v.), and in the 16th and 17th cents. was a Huguenot (q.v.) stronghold. In 1814 Wellington defeated the French here. T. is the seat of a bishopric, and has a 12th-cent. cathedral. There is a school of artillery, armament works, and manufs. of shoes, furniture, and pottery. It is noted for its horses. Th. Gautier, Barère, and Foch (qq.v.) were b. here. Pop. 44,850.

Tarbolton, tn and par. of Ayrshire, Scotland, on Fail Water, 6 m. ENE. of Ayr. Pop. (tn) 2200; (par.) 6129.

Tarbush, see FEZ.

Tardieu, André Pierre Gabriel Amedée (1870-1945), Fr. politician, b. Paris. He became a diplomat, but then took up journalism and became foreign editor of the *Temps* and editor of the *Revue des deux mondes*. He became a deputy in 1914. At the peace conference, 1919-20, he was a colleague of Clemenceau, with whom he later founded the *Echo national*, and strenuously opposed any revision of the Versailles Treaty. T. was Premier for 3 periods, and from 1936 was a strong critic of the politics of the Third Republic.

Tardieu, Jacques Nicolas (1718-95), an engraver, son of Nicolas Henri T. (1674-1749). He received his artistic tuition from his father, became a member of the Fr. Academy, and was one of the group of engravers who worked after Watteau and his school.

Tardigrada, Bear Animalcules, or Sloth Animalcules, order of Arachnida. They are microscopic animals living amongst damp moss. There are 4 pairs of short, stumpy legs, each ending in a pair of claws; the body is covered by a thin cuticle.

Tardiveau, René, see BOYLESVE.

Tare. The Hairy T. is *Vicia hirsuta*, the Slender T., *Vicia tenuissima*, both leguminous trailing anns. native to Britain. The T.s of the parable (Matt. xiii) are probably darnel.

Taree, tn on Manning R., 235 m. N. of Sydney. T. is the centre of a thriving dairying and maize-growing dist. Pop. 7610.

Tarentum (Gk *Taras*; modern *Taranto*, q.v.), Gk colony in Italy, on the W. coast of the peninsula of Calabria. Its greatness dates from 708 BC, when the original inhab. were expelled by a body of Lacedaemonian Partheniae under the guidance of Phalanthus. It remained autonomous, though with varying fortune, until 272 BC, when it was captured by the Romans. It revolted during the second Punic war, but was retaken in 209 BC, and was subsequently an ally and (in 123) a colony of Rome. It was taken by the Saracens in 830.

Target, or **Targe**: 1. A round shield (q.v.).

2. From its similarity to the above, the object at which archers and, later, rifleman aim at was also called a T. In archery a T. is a circular frame of straw, painted with concentric rings of 4½ in. width; there are 5 rings, counting respectively 1, 3, 5, 7, or 9 points. For some time 'match' T.s of rectangular shape were solely used by soldiers; the 'bull' counted 4 points, the inner ring 3, and either a 'maggie' (a shot in the second of the T.'s 2 rings) or an outer 2 points. 'Service' T.s which are now used in the Brit. Army consist of a brown head and shoulders shown against a dark canvas ground, etc.

Targovishte (formerly Eski-Dzhumaya), tn of Bulgaria, in Kolarovgrad prov., on the Vrana, 17 m. W. of Kolarovgrad (q.v.). It has textile, furniture, and pottery manufs. Pop. 11,000.

Targoviste, see TIRGOVISTE.

Targu Mures, see TIRGU MURES.

Tarifa (Roni, Julia Transduca), Sp. tn in the prov. of Cadiz, on the Strait of Gibraltar (q.v.). It has harbours on both the Mediterranean and the Atlantic, and the isthmus on which it stands is joined by a causeway to the Isla de las Palombas and the Punta de Marroqui (lat. 35° 59' 50" N.), the most southerly point in Spain. The tn is very Moorish in appearance, and has anchovy and tunny fisheries. Pop. 17,000.

Tariff Reform, see PROTECTIONIST LEGISLATION.

Tariffs. Tariff comes from the Arabic *tarif* (notification) via the It. *tarifa* (arithmetic, ratebook), and means (a list of) duties or customs to be paid on imports (usually) or exports; or the law imposing them. T. are imposed for protection or revenue purposes. Although the U.K. abolished protective T. in the 19th cent. a number of T. were retained for purely revenue purposes (on tea, coffee, wine, spirits, etc.), excise duties being imposed as necessary to offset any protective effect. T. may be levied on weight or value, percentage duties on value being known as *ad valorem* duties.

The article on customs duties (q.v.) discusses early Eng. T. and cites the consolidating enactments of 1787, 1853, and 1876. Together with Free Trade (q.v.), it gives an outline of U.K. T. since the Free Trade era. The latter article discusses developments since the 1930's and refers to the General Agreement on Tariffs and Trade (G.A.T.T.) (q.v.) of 1947.

In the U.S.A. the first Congress, in 1789, enacted a tariff which served to provide both revenue and protection simultaneously—an unusual and difficult feat. After the 1812-15 war with Great Britain, T. were raised to stem the flood of Brit. goods, with further measures of protection up to early in the 1830's, whence a tendency towards lower T. prevailed generally up to the Civil war of 1861-5. After the war the Republicans passed a number of high-duty T. up to and including the Fordney-McCumber tariff of 1922 and the Hawley-Smoot tariff of 1930, interrupted from time to time by lower T., such as the Wilson-

Underwood tariff of 1913, promoted by the Democrats. The 1930 Act has been weakened through amendment in 1934 by the Reciprocal Trade Agreements Act empowering the president to reduce duties by 50 per cent. By 1939 agreements had been made with 21 countries. Further powers were given later, and further reductions negotiated at Geneva in 1947 under G.A.T.T. and again at Annapolis in 1949 and Torquay in 1951.

Tarja: 1. Dept of Bolivia, with Paraguay on the E. and Argentina to the S. The Camblaya R. flows through the dept and forms its N. and NW. border. The E. dists. are part of the Gran Chaco. Wheat, maize, wine, and tobacco are produced, cattle are reared, and there are extensive forests. T. includes proven oil-bearing lands. Area 9570 sq. m.; pop. 136,000.

2. Cap. of the above, on the T. R., 180 m. SE. of Sucre. The T. valley yields prehistoric animal remains. There is a cathedral, a univ., and an airport. Rubber, asphalt, and quinine are produced. Pop. 17,000.

Tarik, see GIBRALTAR.

Tarika, see SUFISM.

Tarim, important riv. of Sinkiang, China, formed by the junction of the Yarkand-Daria and the Khotan-Daria. The T. is a sluggish stream, shallow and tortuous, and after flowing by the side of the desert of Takla-makan, and through the oases of Yarkand, Kashgar, Aksu, etc., it dies away in the marsh of Lop Nor, after a course of 1000 m. The area of its basin is 354,000 sq. m., of which over half consists of arid deserts, including those of Takla-makan, or Gobi, and Kumtagh. The region has been explored by Sven Hedin and Sir Aurel Stein, who discovered the ancient civilisation of the T. basin.

Tarim Desert, see TAKLA-MAKAN.

Tarin, see SISKIN.

Tarkington, (Newton) Booth (1869-1946), Amer. dramatist, novelist, and essayist, b. Indianapolis, Indiana. Educ. at Purdue and Princeton Univs., he was a member of the Indiana House of Representatives in 1902-3, but then gave up politics to devote himself to writing. He was successful with his first book, *The Gentleman from Indiana*, 1899, the model for further realistic novels of Middle W. life. He won the Pulitzer Prize for novels twice (a record) with *The Magnificent Ambersons*, 1918, the chronicle of the decline of an Indiana family, and *Alice Adams*, 1921, the story of a girl whose love affair with a man of higher social standing is ended when he meets her mediocre family. Among others were *The Two Van Rensselaers*, 1902, *The Conquest of Canaan*, 1905, and *The Plutocrat*, 1927. In another vein were his stories of young people, *Penrod*, 1914, its sequels, and *Seventeen*, 1916, which won a new success for him. Standing apart in his work is the romance *Monsieur Beaucaire*, 1900. T. dramatized it, and the play had much success in the U.S.A., and as the libretto of a popular opera in England. His many other plays include *Clarence*, 1919, and comedies (with H. L. Wilson and J. Street). His

reminiscences, *The World Does More*, appeared in 1928. In 1942 he was awarded the Roosevelt Distinguished Service Medal, and in 1945 the Howells Medal of the Amer. Academy of Arts and Letters. He held honorary degrees of Princeton, de Pauw, and Columbia. See life by A. D. Dickinson, 1926.

Tarlao, or Tarlag: 1. Prov. of Luzon Is., Philippines. The chief products are coconuts, rice, and sugar. Area 1175 sq. m.; pop. 327,018.

2. Cap. of the above, 65 m. NNW. of Manila. Pop. 64,597.

Tarlatan, gauze-like muslin used for ladies' dresses, etc., originally produced in India. It occurs in white and colours, and is often printed.

Tariton, Richard (d. 1588), comedian, distinguished for his performance of the clowns of the old Eng. drama. One of his last performances was in *The Famous Victories of Henry V.*; this was in 1588 at the 'Bull' in Bishopsgate Street. T. is known to have written at least one play, *The Seven Deadly Sins*, which, though never printed, and now lost, was much admired. There is a portrait of T. in his clown's dress, with his pipe and tabor, in the Harl. MS. 3885; and a similar one on the title-page of a pamphlet called *Tariton's Jest*, 4to, 1611.

Tarn: 1. Dept of S. France, formed of part of the anct prov. of Languedoc. It is watered by the T. and its trib. the Agout. In the E. and SE. are the high plateaux of the Sidobre, in the W. there is a fertile plain, and in the rest of the dept there are small, wooded hills. Cereals, vines, and vegetables are produced, and livestock is raised. Coal, iron, and zinc are mined, and there are metallurgical, textile, leather, glass, and paper industries. The prin. tns are Albi (the cap.) and Castres (qq.v.). Area 2231 sq. m.; pop. 308,200.

2. Riv. of France, rising in the Cévennes and flowing into the Garonne. The chief tns on its banks are Albi and Montauban. Length 225 m.

Tarn-et-Garonne, dept of S. France, formed from parts of the anct provs. of Guyenne, Gascony, and Languedoc. It is an alluvial plain formed by the confluence of the rvs. Garonne, Tarn, and Aveyron. There are some hills, generally wooded. Cereals, fruit-trees, vines, and truffles are produced, and sheep are raised. There is little industrial development. The prin. tns are Montauban (the cap.) and Castelsarrasin (qq.v.). Area 1440 sq. m.; pop. 172,400.

Tarnopol, see TERNOPOL.

Tarnowskie Góry, tn of Poland, in Katowice prov., 15 m. NNW. of Katowice (q.v.). It was transferred from Germany to Poland in 1921. There are coal and iron mines. Pop. 16,000.

Taro, see COCCO.

Tarots, see CARDS, PLAYING.

Tarpaulin, large sheet of the coarsest kind of linen or hempen cloth, saturated with tar to render it waterproof. It is used for covering loaded wagons, the hatchways of ships, etc., as a temporary protection from wet. See WATERPROOF.

Tarpeia, daughter of Spurius Tarpeius, the governor of the Rom. citadel on the Saturnian hill, afterwards called the Capitoline. During the Sabine war she was tempted by the gold bracelets which the Sabines wore to betray the Capitol to them. But on entering, the Sabines crushed her to death beneath their shields. The Tarpeian rock, a part of the Capitoline, was used as the place of execution for traitors.

Tarpon (*Megalops atlanticus*), giant herring-like fish plentiful in warm Amer. seas and off W. African coasts. It grows to a length of 7 ft or more, and to a weight of over 300 lb., the scales, which are tough like thin horn and are made into ornaments, sometimes being as much as 5 in. in diameter.

Tarquinius (formerly Corneto), It. tn, in Lazio (q.v.), 20 m. SW. of Viterbo (q.v.). It stands near the mouth of the Marta, and in the late Middle Ages was a busy port. Near by is the site of the anct city of Tarquinii, one of the cities of the Etruscan Confederation (see ETRURIA), where a great number of antiquities have been discovered; an Etruscan necropolis, with tombs dating from the 6th to the 2nd cents. BC, still exists. T. has manufs. of pottery and matches. Pop. (tn) 6400; (com.) 8100.

Tarquinii, see TARQUINIA.

Tarquinius, name of a family in early Rom. hist., to which the fifth and seventh kings of Rome belonged: *Lucius Tarquinius Priscus* (616-579 BC), fifth King of Rome, defeated the Latins and Sabines, and, according to one tradition, the Etruscans. He is reputed to have modified the constitution and to have begun the building of the sewers and the Circus Maximus. He was murdered after a reign of 38 years. *Lucius Tarquinius Superbus* (534-510 BC), the seventh and last King of Rome. His cruelty and tyranny obtained for him the surname of 'Superbus.' But, though a tyrant at home, he raised Rome to great influence and power among the surrounding nations. He defeated the Volscians and took Gabii. Owing to his son Sextus's rape of Lucretia, the wife of his cousin, T. Collatinus, T. Superbus and his family were exiled in 510 BC. The people of Tarquinii and Veii took up his cause and marched against Rome, but they were unsuccessful. T. next obtained the help of Lars Porsena, King of Clusium, who marched against Rome, but was induced to make peace with the Romans. Thereupon T. took refuge with his son-in-law, Octavius Mamilius, who induced the Lat. states to declare war against Rome, but they were defeated at the battle of Lake Regillus. T. then fled to Aristobulus at Cumae, where he died. It should be noted that the story of the Tarquins contains many inconsistencies, and may therefore be treated in great part as legend.

Tarracina, see TERRACINA.

Tarraco, see TARRAGONA.

Tarragon (*Artemisia dracuncul*), aromatic perennial plant, the green or dried leaves of which are used for flavouring vinegar.

Tarragona: 1. Sp. prov., in Catalonia (q.v.), with a coast-line on the Mediterranean. It is mountainous, and has a temperate coastal plain containing the mouth of the Ebro (q.v.). There is much forest, and the valleys are fertile. Wine, fruit, olive-oil, silk, hemp, and cereals are produced. Copper, lead, silver, limestone, and marble are found. Area 2506 sq. m.; pop. 361,400.

2. (anc. **Tarraco**) Sp. city, cap. of the prov. of T., on the Mediterranean coast at the mouth of the Francolí. Already anct. in Rom. times it became the cap. of Hither Spain, *Hispania Tarraconensis* (see SPAIN, History). The Visigoths sacked it in 467, and the Moors in 714. Alfonso I (q.v.) of Aragón took it from the Moors in 1120. In 1811 it was sacked by the French, and later in the cent. the tn was replanned. The older part of T. stands on a high rock and has remarkable walls, portions of which date back to about the 6th cent. BC. The Romanesque and Gothic archiepiscopal cathedral stands on the site of a temple of Jupiter. In the tn and in its vicinity are numerous Rom. remains, including an amphitheatre and an aqueduct; in some cases the remains of Rom. buildings have been incorporated into more modern structures. The port of T. has a coasting trade in the produce of the Ebro valley. Chartreuse liqueur is made, and T. wine is well known. Pop. 39,700.

Tarrasa, Sp. tn in the prov. of Barcelona. It is an important industrial centre, with cotton and woollen mills, and has a trade in agric. produce, oil, and wine. Pop. 46,000.

Tarrytown, vil. of New York in Westchester co., on the Hudson R. 25 m. N. of New York City. It is famed as the 'Sleepy Hollow' of Washington Irving's story; he lies buried here, and his home is near by. T. is the seat of Marymount College for Women. It manufs. clothing and wood products, and automobile assembling is also carried out. Pop. 8851.

Tarshish, in biblical geography, a far-distant locality, rich in silver, iron, tin, and lead (Ezek. xxvii. 12). The largest ships of those days were called 'ships of Tarshish' (Ezek. xxvii. 25). It is commonly identified with the anct Tartessus, situated in the S. of Spain, which in the 8th and 7th cents. BC was under Phoenician hegemony (see ANDALUCIA). Less probable is the identification of T. with Tarsus (q.v.).

Tarsier (*Tarsius tarsius*), small primate intermediate between lemurs and monkeys, a native of the E. Indies. They are about the size of a small rat, have very large eyes, very long ankle bones, sucker-like disks on the fingers and toes. The T. lives in trees, is nocturnal in habit, and feeds mainly on insects. Its skull closely resembles the ape type.

Tarsipes Rostratus, the Noolbenger or Honey-mouse, a tiny marsupial, native of W. Australia. It is arboreal in habit, and feeds on insects and honey, the latter being extracted from flowers by the long extensile tongue.

Tarsus, city of Cilicia in Asia Minor, near the R. Cydnus, about 20 m. WSW. of Adana. It was the bp. of St Paul.

Tartaglia, Niccolo (c. 1500-67), It. scientist and mathematician, b. Brescia. He was mainly interested in the scientific and mathematical problems of gunnery and the art of warfare, particularly in projectiles. In 1521 he was a teacher of mathematics in Verona, and discovered a method of solving certain cubic equations, for which Cardan (q.v.) unjustly got the credit. His chief works are *Nova Scientia*, 1537, on the theory and practice of gunnery, and *Trattato generale di Numero e Misura*, 1556, 1560, dealing with arithmetic, algebra as far as quadratic equations, geometry, and mensuration. He pub. the first It. trans. of Euclid and the earliest version of some of the prin. works of Archimedes, 1543.

Tartan (from Fr. *tiretaine*, a linsey-woolsey cloth). The word has come to mean the distinctive woollen cloth in which coloured threads are woven into both weft and warp at intervals to give a checkered or cross-striped effect, some patterns being so closely associated with certain highland Scottish families or clans as to be regarded as their exclusive property. In this modern sense T.s probably date from the upsurge of nationalism which eventually led to the Scottish rebellion of 1745, after the failure of which they were proscribed for 35 years. The rescinding of the proscription led to a new enthusiasm for T.s, but speaking generally new sets of designs were adopted by the qualifying families which did not correspond to those appearing in earlier family portraits. In recent years many scraps of older T.s have been carefully collected by scholars, and some of these are being again called into use. The use of T.s of different patterns or setts as a clan or family distinction is a feature of the great Scottish social system of clan-ship in which the essential link is a theory of kinship between the chief and the people of the clan, though in large clans subdivisions into chieftains and setts have arisen for historical reasons.

The theory that distinctive clan or family T.s date from a period earlier than the 17th cent. cannot be supported by evidence. The use of checkered and striped cloths by primitive peoples is natural: the wool of the black sheep woven in a pattern of stripes or squares into the wool of the white sheep is the simplest form of decorative weaving, and it is this effect that is known as 'shepherd's plaid.' In the later Middle Ages cheap striped woollen cloth, which had been imported from N. Africa and was forbidden by the Pope because by that time it brought ridicule on the order. This cloth has remained a part of the general wear of the Arab peoples. Striped materials have often formed a part of European fashion, but it is only in Scotland that the systematic weaving of checkered cloths has taken on a special significance, and from surviving pieces it can be seen that the earliest T.s were

often very elaborate in the arrangement of their colours. They were also, since only vegetable dyes were used, quite different in colour from modern T.s, though not necessarily less bright. Some families and clans have more than one T., a separate design being used, for instance, as a 'hunting' T. At the end of the 18th cent. certain 'loyal' regiments having Scottish associations were ordered to adopt their own regimental T.s from which kilts or trews (q.v.) and plaids were made. See also HIGHLAND DRESS.

Tartar Emetic, or **Potassium Antimonyl Tartrate** ($C_4H_4O_6K(SbO) + 4H_2O$), prepared by boiling potassium hydrogen tartrate with antimonious oxide and water. It is readily soluble in water, and is used in dyeing as a mordant and in medicine as an emetic. In the form of intravenous injections it is highly effective in the treatment of a number of tropical diseases due to animal parasites such as filariasis (q.v.) and schistosomiasis (q.v.).

Tartaric Acid, or **Dihydroxysuccinic Acid** ($C_4H_4O_6$), commonly occurring vegetable acid, contained in grapes and other fruits. During the later stages of the fermentation of grape-juice, impure potassium hydrogen tartrate or argol is deposited. From this salt the commercial acid is prepared. The crude argol is partially purified by recrystallisation from hot water, and it is then boiled in solution with chalk. Calcium tartrate is deposited, and the T. A. is set free from this by treating with dilute sulphuric acid. The acid forms large transparent crystals, is readily soluble in water and alcohol, but insoluble in ether (melting point $167^\circ C$). Like other dicarboxylic acids, it forms both hydrogen and normal salts. The acid salt is known as 'cream of tartar' and the potassium sodium salt as 'Rochelle salt'. T. A. is used in the preparation of effervescing drinks and in baking powders. There are 4 optical isomers of the acid, viz. dextro-tartaric, laevo-tartaric, meso-tartaric (inactive), and racemic acid (inactive).

Tartars, see TARARS.

Tartarus: 1. Son of Aether and Gaia, and, by his mother, father of the giants Typhoeus and Echidna.

2. In Homer, a place of punishment reserved for the rebel Titans, as far below Hades as heaven is above the earth. Later poets use the name as synonymous with Hades.

Tartini, Giuseppe (1692-1770). It. composer and violinist, b. Pirano. Having clandestinely married the niece of the Archbishop of Padua, he had to flee to Assisi but eventually returned to Padua. In 1728 he started a violin school of European fame. His compositions for violin comprise about 150 sonatas, 50 trios, and about 140 concertos. T. made sev. improvements in the technique and construction of the bow.

Tartu (Russian Vur'yev 1030-1224 and 1893-1918, Derpt before 1893; German Dorpat), tn and chief cultural centre of the Estonian Rep., 100 m. SE. of Tallinn. It has varied industries. There is a univ. founded 1832 by Gustavus Adolphus of

Sweden, closed in 1710, and re-opened in 1802 by Alexander I; the language of instruction was German till 1895, Russian till 1918, and has been Estonian since, a univ. library (1802, largest in the Baltic reps.), a botanical garden (1803), and an observatory (1809). Pop. (1956) 70,400. T. was founded by the Russians in 1030 on the site of the Estonian village of Tarpatu, and belonged variously to the Livonian Order, Muscovy, Poland, and Sweden; it was Russian from 1704, and occupied by the Germans in 1918 and 1941-4. The peace treaties were signed here by Soviet Russia with Estonia and Finland in 1920. It was the cap. of T. Oblast within the Estonian Rep. 1922-3 (abolished).

Tarudant, the cap. of the prov. of Sus, Morocco, about 125 m. SW. of Morocco, and between the R. Sus and the Atlas Mts. It is an important caravan centre. The chief minerals are copper, iron, and silver, while copper goods are manufactured, and dyeing and tanning carried on. Pop. 8793.

Tarvisium, see TREVISO.

Tascher de la Pagerie, Joséphine, see JOSEPHINE, MARIE ROSE.

Tashauz: 1. Oblast (prov.) of the Turkmen S.S.R. of the Soviet Union. The N. section is drained by arms of the Amu-Darya. S. is mainly desert. Cotton is grown in irrigated areas. Pop. 265,000.

2. Cap. of the above on a trib. of the Amu-Darya, 40 m. NW. of Khiva. Pop. 70,000.

Tashi, or **Tesho**, **Lama**, see under LAMA-ISM.

Tashkent: 1. Oblast (prov.) of the Uzbek S.S.R., with the Kazakh S.S.R. to the N., the Kirghiz S.S.R. to the NE., and the Tadzhik S.S.R. to the E. and S. Cotton and fruit are extensively cultivated, and the oblast contains sev. important industrial centres, including Angren (coal), Begovat (steel), and Chirchik. Pop. 1,350,000.

2. Cap. of the Uzbek S.S.R., the largest city and the cultural and economic centre of Central Asia, on a trib. of the Syr-Darya, 160 m. N. of Samarkand. T. is taken by the Chinese in AD 659. It is divided into 2, the native oriental and the modern Russian, and is well built, with large public edifices. It contains many mosques and old houses built of sun-baked bricks. The streets are lined with the shops of carpet weavers, metal workers, and potters. In the newer quarter of the tn there are flour mills, leather, food, and fruit-preserving factories, and textile mills, surrounded by broad streets and modern flats and bungalows. A univ. was estab. in 1919. The trade of the city is important; the chief manufs., besides those mentioned, include nitrogenous fertilisers, cotton and silk, and textile machinery. It is an important centre of coal production, notably from the mines at Angren. Non-ferrous metals are mined at Kara Mazar and Amalyk near by. It is connected with the main Russian railways at Chkalov and with Novosibirsk and Alma Ata by the Turksib line. It is also

served by air lines to Moscow and elsewhere. Pop. 600,000.

Tashkurghan, the chief place in the dist. of Khulm, Afghan Turkestan, 4 m. S. of the ruined tn of Khulm. It is an important trading centre. Pop. 50,000. *Tashmetum*, see NABU.

Tasman, Abel Janszoon (1603-59), Dutch navigator and explorer, b. Lutjegast. After journeys in China and India, he was sent by the Dutch East India Company to investigate the extent of Australia. He discovered Van Diemen's Land, later renamed Tasmania, in 1642, and also New Zealand, the Fiji and Friendly Is., and the Gulf of Carpentaria. His jour. appeared in an Eng. ed. in 1898.

Tasman Glacier, in the S. regions of the S. Is. of New Zealand, discovered in 1862 by Julius von Haast. It has a total area of just over 20 sq. m.

Tasman Sea, name given to the Pacific waters which lie between New Zealand and Australia and Tasmania.

Tasmania, one of the 6 states of the Commonwealth of Australia, an is. separated from Victoria by the Bass Strait, which is about 140 m. wide. It lies between the parallels of 40° 40' and 43° 38' S. lat., and 144° 30' and 148° 30' E. long. A little smaller than Scotland, it is the smallest of all the Australian states as well as the most temperate and pleasant. The N. coast forms a concave curve flanked by the is. groups of Furneaux (E.) and the Hunter and King Is. (W.). The N. and W. coasts are not greatly indented, but have some good harbours. The E. coast is much more indented, whilst the S. and SE. coasts are formed of a series of curiously shaped peninsulas. Area, including dependent is., 26,215 sq. m.; pop. 340,000.

Physical Features. It is conjectured that T. was once part of the mainland, the is. in the strait being, it is supposed, part of a mt range that connected the 2 lands. T. is a beautiful, well-watered is., rich in harbours and inlets, crossed by high mt chains, full of crags, glens, and ravines of bold appearance, the basaltic cliffs of some being sev. hundred ft in height. On the coast there are good anchorages, and many excellent harbours.

The prin. is. belonging to T. are over 50 in number: the Furneaux Group, at the E. end of Bass Strait, and off the NE. corner of T., including Flinders Is., with an area of 800 sq. m., Cape Barren Is., 170 sq. m., and Clarke Is., 30 sq. m.; besides these are Chappell Is. and Kent's Group, aggregating about 40 sq. m. On these is. live a number of so-called half-castes, descended from the offspring of sealers and native women. Strictly, however, they are of mixed and almost untraceable ancestry.

T. has 2 mt chains, separated by the central dist., through which is the communication between the N. and S. of the is. That to the E., or the dividing range, has an average height of 3750 ft. and runs nearly N. and S., parallel with the E. coast. Among the peaks are Row Tor, or Mt Arthur, 3895 ft.; Mt Barrow, 4664 ft.; Mt Victoria, 3964 ft.; Ben Nevis, 3910 ft.; and Ben Lomond 5160 ft. The

W. chain is an elevated table-land, averaging 3000 ft in height, in the centre of the is., which contains all the large lakes and from which branch many ranges in all directions except eastward. From this table-land spring the peaks, Table Mt, 3582 ft.; Barn Bluff, 5114 ft.; Mt Field West, 4721 ft.; Cradle Mt, 5089 ft.; and a number of others over 4000 ft. In the S. is Mt Wellington (4166 ft.), at the foot of which is Hobart.



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The is. is well watered, and abounds in rivs., rivulets, and creeks, many of them rising from the lakes of the table-land, the average fall to the sea being estimated at 93 ft per in. The prin. rivs. are the Derwent, about 130 m. long (on the estuary of which is Hobart, with a deep and sheltered harbour accommodating the largest vessels afloat), which issues from Lake St. Clair, receiving in its course the R.s Nive, Dee, and Jordan from the N., and the Florentine and Russell from the S.; the Huon, about 100 m. in length, issuing from Lake Edgar; along the riv.'s shores the great apple orchards of the state are situated, and it receives the Cracroft and Picton from the S., and the Weld and Russell from the N., and falls into D'Entrecasteaux Channel; the Coal R., rising in the E. chain of mts, and running S. into Pittwater. The mouths of these 3 rivs. are in the SE. of T. To the SW. and W. are the Davey R., the Spring, the Gordon, with tribs. the Wedge, Denison, Serpentine, and Franklin R.s., falling into Macquarie Harbour; King R., with its tribs. the Queen and Eden, also falling into Macquarie Harbour; the Pieman R., consisting of the R.s Mackintosh, Murchison, Huskisson, and Donaldson; and the Arthur R.—these 2 last falling into the S. Ocean. On the N., flowing into Bass Strait, are the Montagu, the Duck, the Inglis, the Mersey, and the Tamar (the last-named being

navigable up to Launceston by inter-state steamers, or 40 m. from its mouth). The R. Gordon and King R. on the W. coast are of remarkable beauty. To the NE. are the Piper, Little Forester, and Trent, rising in the W. slopes of Mt Victoria and debouching into Ringarooma Bay. Flowing to the E. are the Anson, emptying into Anson Bay, the George, into George's Bay, Scamander, and Swan.

The W. coast of T. is bold, rocky, and inhospitable, but there are sev. accessible ports. The chief harbours are: on the W. coast, Port Davey (formerly much frequented by whaling vessels), Pleman R., and Macquarie Harbour; on the N. coast, Stanley, at Circular Head, Emu Bay, and Port Frederick, at the mouth of the Mersey; on the E. coast, George's Bay, Oyster Bay, Prosser Bay, Spring Bay, and Fortescue Bay. The S. and SE. of the is. is studded with safe bays and harbours, the prin. being Port Arthur, Storm Bay, Norfolk Bay, Frederick Henry Bay, D'Entrecasteaux Channel, Port Esperance, and Southport.

There are numerous extensive fresh-water lakes on the elevated table-lands, the largest being the Great Lake, in the co. of Westmorland (3822 ft above sea-level), covering an area of upwards of 40 sq. m.; Lake Sorell, in the co. of Somerset, about 20 sq. m.; Lake St Clair; Arthur Lake; and Lake Echo. These lakes form the head-waters of the prin. streams flowing S., W., and N.

In physical characteristics the surface of T. is uneven, being a succession of hills and valleys of varying height and depth, and peaks and glens, and it presents a pleasing variety of scenery, with snow-capped mts, glassy lakes, wild shores, green valleys, and extensive sheeplands, studded with neat homesteads, and subdivided into fields and highly cultivated gardens and orchards. T. is very popular as a holiday resort.

Climate and Rainfall. In climate and rainfall T. is suggestive of England, though warmer and sunnier. Hot winds are almost unknown, and the summer heat is tempered by sea breezes and mt air. The average temp. of Hobart in the hottest month is 61.1° F. The winter is cold enough to produce thin ice in the lowlands and snow in the mts and plateaux. The average temp. in the coldest month is 46.6° F. The mean temp. for the year is 53.9° F. The average rainfall of T. is about 29.6 in., but there is much variation in different dists., rainfall in the W. sometimes reaching to 170 in. per year.

Geology. The great mt range that traverses nearly the whole of the central part of T. is of trap, or greenstone, formation, and its upheaval has burst through the more recent rocks of sandstone, clay-slate, and limestone that once overlaid it. The rocks on the E. and SW. coasts are respectively granite and quartz, associated with vast quantities of micaceous rocks. In the NE. portion of the is., granite and metamorphic rocks exist in large masses, and in still larger quantities all over the SW. corner. Mt Wellington consists mainly of massive

greenstone. Volcanic action in parts of the is. is strongly marked, and igneous and volcanic rocks are prevalent.

Flora. Mt slopes are covered with big timber: eucalyptus, King William pines, with girths up to 30 ft, Huon pines, white flowering myrtles rising to 150 ft, blackwood, and acacia (100 ft); shrubs include oleander, tea-tree, green fuchsias, and crimson waratah.

Fauna. The fauna in general is that of Australia, but there are sev. species peculiar to the is.—the T. devil (*Sarcophilus ursinus*) and the tiger (or striped) wolf, which, on account of the damage it wrought to sheep, is now extinct. Among other larger indigenous animals are the native hyaena (*Thylacinus cynocephalus*), wombat (*Phascolomys ursinus*), platypus, and, among smaller, the bandicoot and native cat. The majority of these are nocturnal in their habits. Among reptiles are snakes (tiger, copperhead, and whip), lizards, and iguanas. Among land birds are cockatoos, jays, whitehaws, eagles (*Aquila audax*), sparrowhawks, owls, moreporks, paroquets, diamond birds, blue wrens, firetails, and many others. Among those of the lakes and sea-coast are black swans, snipe, herons, bitterns, petrels, cormorants or shags, etc. The sheltered bays abound in fish: trumpeter, perch, rock-cod, flathead, whiting, colonial salmon. The prin. fresh-water fish are the eel, blackfish, and trout.

Production. Manufactures, etc. The vegetation of T. is practically identical with that of Australia; the eucalyptus is the most predominant feature. Of the 16,778,000 ac. comprised in the state, over 10,000,000 ac., mostly mt land, are unalienated, of this area some 2,072,000 ac. being leased. The chief farm crops are wheat, oats, peas, turnips, potatoes, hay, and apples. Cereals of all kinds and root crops thrive in most parts of the is., the soil of decomposed basalt situated in the NW. and NE. being especially fertile. Hops grow well in the S. and the Tasmanian fruits—particularly apples—are well known. Apple production exceeds 5,000,000 bushels. Potatoes and mixed farming are accountable for much of the prosperity of the state. Wool production has reached an ann. value of over £6 m.; butter production was over 10,214 tons in 1955-6 and cheese over 292 tons. The chief minerals are copper, tin, silver, lead, zinc, gold, coal, and osmiridium. The total value of mineral output in 1955 was over £8,950,000. A rich copper-mining industry exists at Queenstown on the W. coast, that part of the is. being the chief source of minerals. Forestry is a great feature of T. The chief timber is the hardwood variety (eucalyptus), and the chief export timbers are the stringy-bark and blackwood, the former being used for bridges, railway sleepers, etc., and the latter for furniture and cabinet work. Other woods are Huon, celery-top, and King William—all species of pine. Industries include woollen mills, jam and fruit-preserving factories, bricks and cheese factories, tanneries, bricks and pottery, saw-mills, joinery and furniture,

engineering, railway works, flour mills, boot and shoe factories, printing, and paper-pulp making. In 1955-6 exports were valued at £A80,003,308, the prin. items being butter and cheese, fruit, preserves, copper, peas, potatoes, wool, and woollen manufs., zinc, timber, and hides and skins. Imports were valued at £A72,829,000. The 2 important export industries are metal extraction and fruit preserving. Cheap electric power is a strong factor in the prosperous industrial hist. of the state, the Great Lake being a chief source. The chief tns and centres are linked up with the railway system, which comprises 800 m. of track (614 being state-owned). Chief tns: Hobart (cap. city) (pop. 58,300; with suburbs, 97,440), Launceston (with suburbs, 50,690), Devonport (12,200), Burnie (11,200), Deloraine, Latrobe, Lilydale, Scottsdale, Oatlands, Ross, New Norfolk, Geevestown, Sorell. There is a univ. of T., estab. in 1890. Most of the primary teaching is at stato schools. Secondary education is about equally divided between state high schools and the older endowed schools. There are also sev. technical schools. There are a supreme court, courts of petty sessions, and general sessions.

History and Government. T. was originally called Van Diemen's Land and was discovered by Tasman on 24 Nov. 1642. In 1777 it was visited by Cook, who thought it formed part of the mainland. Lt. Wm Bligh planted Eng. fruit trees at Adventure Bay on 17 Aug. 1788, on the outward voyage of the *Bounty* to Pitcairn Is. It was proved an is. by circumnavigation by Bass and Flinders in 1798. Other notable explorers who visited the is. were Du Fresnoy (1772), Furneaux (1775), D'Entrecasteaux (1792-3), and Hayes (1794). The earliest settlement, mostly of convicts, was estab. under Lt. Bowen at Risdon, on the R. Derwent, by Governor King of New S. Wales, in 1803. In 1804 another expedition reached Port Dalrymple (Tamar R.) and formed a settlement at George Town. The is. was used as a penal settlement, and increasing numbers of convicts were sent there after transportation to Australia had ended. The system ceased in 1853. In 1825 the is., which had previously formed part of New S. Wales, was proclaimed a separate colony, and in 1856 the name of Van Diemen's Land was changed to T. and responsible gov. granted. In 1901 T. united with the states of the mainland in establishing the Commonwealth of Australia. Parliament is bicameral: the House of Assembly (30 members), which is elected by adult suffrage by proportional representation by single-member votes in 6-member constituencies, and the Legislative Council (19 members), with limited adult suffrage. The queen is directly represented by the governor, who presides over the Executive Council. T. elects 5 members of the Commonwealth Lower House and 6 of the Upper House.

Aborigines. These numbered in 1803 about 2000, but the pure aboriginal is now wholly extinct. The Brit. treatment of

them was cruel, the prin. offenders being bush-rangers and the lower type of convict stockmen; and for the first 80 years after the settlement a constant war was waged between native and settler. Finally, about 1840, some attempts were made to preserve them on reservations on Flinders Is. in Bass Strait. But their mortality rate was so high that by 1847, when they were removed to Oyster Bay, near Hobart, fewer than 50 remained. Wm Lanne, the last full-blood male, died in Hobart Hospital in 1869.

See H. L. Roth, *The Aborigines of Tasmania* (2nd ed.), 1914; J. B. Walker, *Early Tasmania*, 1914; G. Wittram, *Western Tasmania*, 1914; R. W. Giblin, *The Early History of Tasmania*, 1928-39; State Development Board, *Tasmania: its People and Possibilities*, 1929; G. L. Wood, *The Tasmanian Environment* (2nd ed.), 1930; C. Barrett, *Isle of Mountains*, 1948; *Tasmanian Almanack* (ann. pub.).

Tass (Russian abbreviation for Telegraphic Agency of the Soviet Union), official Soviet Russian news agency attached to the U.S.S.R. Council of Ministers. It was estab. in 1925. T. is the only agency in the U.S.S.R. for both internal and foreign news, and in its work it is subordinated to the Propaganda Dept of the Central Committee of the Communist Party of the Soviet Union (q.v.).

Tassie, James (1735-99), gem-engraver and modeller, *b.* Pollokshaws. With Henry Quin, T. invented the 'white enamel composition' which he used for his medallion portraits and reproduction of gems. The *Descriptive Catalogue*, 1791, of Raspe enumerates 16,000 pieces from his hands, but before his death this had reached 20,000. His nephew, William Tassie (1777-1860), was also an engraver and modeller.

Tassigny, Jean de Latre de, see LATRE. **Tasso, Bernardo** (1493-1569), *b.* Venice; a poet of high contemporary standing, now remembered as the father of Torquato T. (q.v.). Technically skilful, his poetry was marred by exaggeration and bombast, imitating Petrarch and Ariosto. Educ. at Padua, he became secretary to Prince Sanseverino of Salerno. His works, mostly published posthumously, include *Amadij*, 1560, *Floridante*, 1587, and *Rime* (ed. Serassi), 1749.

Tasso, Torquato (1544-95), It. poet, son of Bernardo T., *b.* Sorrento. In 1560 he was sent to Padua to study law, but, influenced by the literary environments of his early years at Rome and Venice, he devoted himself to literature and philosophy. In 1562 he produced *Rinaldo*, a romantic poem dedicated to Cardinal Luigi d'Este, who later became his patron. In 1572 he entered the service of Duke Alfonso at Ferrara. For the court theatre he wrote his pastoral play *Aminia*, 1573. It was in 1576 that he first manifested signs of mental derangement, but he escaped from his first confinement to Ferrara, wandered through the chief cities of Italy and, in 1579, again returned to the court of the Duke of Ferrara; but the duke received him coldly and T. wounded by some real or fancied insult, hurled

denunciations at the whole ducal household, with the result that he was confined from 1578 to 1586 by the duke as insane. During his confinement he produced much admirable verse, a number of philosophical dialogues, and an *Apologia for La Gerusalemme Liberata*, which had been pub. without his consent and with many errors. The grotesque contrast between his fate and the rising fame of his masterpiece had roused public interest in him, and consequently he was released in 1586 on the intervention of Prince Vincenzo Gonzaga. *La Gerusalemme Liberata* had been completed in 1575 and submitted to sev. critics, and on his release T. went to Mantua as the protégé of Prince Gonzaga, and here he rewrote his great epic in accordance with his critics' suggestions. The result, *La Gerusalemme Conquistata*, 1592, was a pedantic effusion, in which he expurgated the fine passages of paganism and chivalry of the original ed. on which his fame ultimately rested, e.g. those relating to the characters Erminia, Clorinda, and Armida, and which made the *Gerusalemme Liberata* for long the most popular work in It. literature. Broken in health, he resumed his old restless wanderings, spending, however, much of these later years between Naples and Rome, helped and protected by many friends and patrons. In 1595 he was summoned by the Pope to be crowned poet laureate, but he died on his arrival in Rome at the convent of Sant' Onofrio, without receiving the honour. T.'s poetry was an attempt to reconcile classic form (e.g. the Virgilian epic in *Rinaldo*) with a deeper note of personal sentiment. His *Gerusalemme*, an idealisation of the first crusade, is a typical literary product of his age, its unquestioning acceptance of classic forms in marked conflict with newly revived theological interests. His other works include a comedy, *Gli Intrighi d' Amore*; a tragedy, *Torrismondo*; *Discorsi*, elucidating his attitude to his own poetry; and religious poems. His *Opere* were ed. by Rosini in 33 vols., 1821-32. The earliest complete ed. of the *Gerusalemme* is that of Bonna, 1581; A. Solerti's, 1895-9, is also reliable. See W. Boulting, *Tasso and his Times*, 1907; C. Previtera, *La poesia e l'arte di T. Tasso*, 1936; E. Donadoni, *T. Tasso saggio critico*, 1946; G. Getto, *Interpretazione del Tasso*, 1951.

Tassoni, Alessandro (1565-1635), It. poet, b. Modena. He was employed in sev. diplomatic missions (1599-1608), and was later in the service of the Duke of Savoy. His prin. works are *La Secchio Rapita*, 1622, (Eng. trans. 'The Rape of the Bucket,' 1715, 1918), a burlesque epic, *Considerazioni sopra il Petrarca*, 1609, and *Pensieri Diversi*, 1612. See life by G. Bertoni, 1935.

Taste, in physiology, sensation caused by the application of certain substances in solution to organs known as taste buds situated on the tongue, and to a lesser degree on the soft palate, the uvula, and adjacent structures. Four T.s are usually identified—sweet, bitter, acid, and saline. All the other delicately differentiated

sensations usually referred to the sense of T. are really smell sensations.

Tata, Yamsetji Nasarwanji (1839-1904), Parsi merchant and philanthropist, b. Nosari in Baroda. He introduced a silk industry after Jap. methods into Mysore, and endowed a research institute at Bangalore. His son Sir Dorabji Yamsetji T. (1859-1932) discovered iron ore in Orissa, estab. an iron and steel works at Jamshedpur, and developed hydro-electric power in the W. Ghats. He made large charitable donations.

Tata, see TATABANYA.

Tatabánya, tn of N. Hungary, cap. of the co. of Komárom, 30 m. W. of Budapest (q.v.). It is an important modern lignite-mining centre. During the anti-Russian upheavals of Oct.-Nov. 1956 the colliers of T. went on strike. At the neighbouring spa of Tata there is a fine Esterházy (q.v.) mansion. Pop. 47,000.

Tatanagar, the site of the steelworks at Jamshedpur (q.v.).

Tatar Autonomous Republic, formed in 1920, lies in the E. of European Russia, occupying a lowland area traversed by the middle Volga and lower Kama. There are extensive oil deposits (see VOLGA-URALS OIL AREA) and large oil (since 1940's), engineering, chemical, woodworking, and fur industries. Grain, sunflowers, and potatoes are grown, and horticulture (apples) and dairy farming practised. The prin. tns are Kazan' (cap.), Chistopol', Bugul'ma. For its early hist. see VOLGA BULGARIANS. Area 26,100 sq. m.; pop. (1956) 2,800,000, mostly Tatars and Russians (since 16th cent.).

Tatars (often, but wrongly, written as Tartars), peoples of mixed ethnic, linguistic, and cultural origin, nowadays speaking Turki languages, professing the Islamic religion with Shamanist influences, and dispersed over the steppes of E. European Russia, Central Asia, and Siberia. The meaning of the term T. is unknown. The word T. appears in the Orkhon inscriptions (q.v.) of the 8th cent. AD, and in later Chinese and Arabic sources, and refers to peoples speaking Mongolian languages and inhabiting the border regions of China, the ter. of present Mongolia and some neighbouring dists. It was later applied to Mongols of Genghis Khan, and particularly to Turki peoples, such as Bulgars, Qipchaks, Turkomans, and others, who preceded and followed the Mongolian invasion of Europe. From the 14th cent. the name Tatar was applied in W. European languages to a vast ter. (corresponding partly to S. Russia and Central Asia) inhabited by T.

Tatary, see TATARS.

Tate, Frank (1863-1939), Australian educationalist, b. Castlemaile, Victoria; educ. the Model School, Melbourne, and the Melbourne Univ. After teaching in Victorian schools and lecturing at the training college, T. was appointed prin. of the teachers' training college, 1899, and in 1902 became first director of education in Victoria. Later he went overseas to study educational problems in Europe and the U.S.A. He was largely responsible for the Education Act, 1910, and

became chairman of the committee of public education appointed under the Act. T. strove to improve training and remuneration of teachers, to encourage the community's interest in education, and to introduce better methods of instruction. The increased number of students and the improvement in education, particularly secondary education, indicate his contribution to the Australian educational system.

Tate, Sir Henry (1819-99), merchant and art patron, b. Chorley, Lancs. He was a sugar merchant, and patented machinery for making sugar cubes. His firm of Henry Tate & Sons later became Tate & Lyle. He was instrumental in founding the Tate Gallery (q.v.) in 1897, and was created baronet in 1898.

Tate, John Orley Allen (1899-), Amer. poet and critic, b. Winchester, Kentucky. Educ. at Vanderbilt Univ.; he was on the Eng. staff at the Univ. of North Carolina and at Columbia; then from 1939 to 1942 was Fellow in Creative Writing at Princeton, from 1944 to 1950 Fellow in American Letters of the Library of Congress, and in 1951 became Prof. of Eng. at the Univ. of Minnesota. In 1936 he pub. *Reactionary Essays in Poetry and Ideas*, and in 1941 *Reason in Madness*, which marked him as one of the leading critics of his time. Later essays are *On the Limits of Poetry*, 1948, *The Hovering Fly*, 1949, and *The Forlorn Demon*, 1952. His poetry, which shows the influence of Donne and T. S. Eliot, includes *The Winter Sea*, 1945, and *Poems 1922-1947*, 1948. He also pub. *Stonewall Jackson—The Good Soldier*, 1928, and *Jefferson Davies—His Rise and Fall*, 1929, and a novel, *The Fathers*, 1938.

Tate, Nahum (1652-1715), poet, b. Dublin, son of a clergyman named Faithful Teate. Educ. at Trinity College there, he settled in London in 1672, and in 1677 pub. *Poems on Several Occasions*. He also wrote some indifferent plays, including an adaptation of Shakespeare's *King Lear* which was defended by Dr Johnson and held the stage till well into the 19th cent. In 1682 he wrote, with Dryden's assistance, a second part to that poet's famous satire *Absalom and Achitophel*. In 1692 he was appointed Poet Laureate in succession to Shadwell, as a result of which Pope pilloried him in the *Dunciad*; and in 1702 he was made Historiographer Royal. His chief original poem was *Panacea or a Poem on Tea*, 1700, but he is remembered mainly for the metrical version of the Psalms in which he collaborated with Nicholas Brady (q.v.); pub. in 1696, it gradually superseded the earlier rendering of Sternhold and Hopkins.

Tate Gallery, The, at Millbank, London, S.W.1., contains the national collection of Brit. painting from the 16th cent. to the present day, of modern foreign painting from approximately 1800, and of modern sculpture. The T. G. has unique collections of the work of Turner and Blake, also one of the best collections of the Pre-Raphaelites and the Fr. Impressionists. Sir Henry Tate (q.v.) financed the build-

ing of the gallery on the site of Jeremy Bentham's 'Model' Penitentiary, and it was opened by King Edward VII as Prince of Wales in 1897. This housed the Tate gift of 65 Brit. paintings, the collection purchased under the terms of the Chantry Bequest (q.v.), the Vernon Collection, bequeathed in 1847, and the Watts gift. Sir Henry Tate made possible the addition in 1899, of 8 further galleries, and in 1910, through the generosity of Sir Joseph Duveen senior, the wing to house the Turner bequest of 1856, which had been in the possession of the National Gallery, was opened, while his son, Lord Duveen, gave an immense sculpture hall, opened in 1937. The nucleus of the collection of modern foreign art was estab. by the bequest of Sir Hugh Lane (q.v.) in 1915, and the endowment by Samuel Courtauld (q.v.) in 1923. The T. G.'s collections have been greatly enriched by many other bequests and gifts, and an effort has been made since the war, in spite of limitations of finance and space, to clarify and extend its 2 separate functions as the National Gallery of Modern Art and National Gallery of British Art (see official report on the Gallery's Function, 1946, and the trustees' report, 1954). During the Second World War the gallery was severely damaged, but repairs were carried out; the T. G. was partly reopened in 1946 and by 1949 all repairs had been completed. A series of important exhibitions have been held since 1946, including those of the works of Blake, Van Gogh, Chagall, Rouault, Matisse, Hogarth, Gainsborough, Richard Wilson, Alexander Cozens, Monet, Kandinsky, and living artists, e.g. Graham Sutherland (1953) and Sir Matthew Smith (1954).

Tati Concession, gold-mining dist., owned by the Tati Company Ltd., of the British Bechuanaland Protectorate, with an area of 2500 sq. m., which was originally conceded by Lobengula in 1887. It is excellent ranching country. The chief tn is Francis Town.

Tatian (d. 150), Christian apologist, Syrian b. in Mesopotamia and Gk-educ., converted to Christianity at Rome and became a disciple of Justin Martyr. He wrote a number of works of which *The Discourse to the Greeks* survives (Migne, *Patrologia Graeca* vi; Otto, *Corpus Apologetarum*, 1867-72). More important, however, was the *Diatessaron*, a harmony of the Four Gospels, written in Greek or in Syriac, of which a Gk fragment was found at Dura-Europos, while an 11th-cent. Arabic version from the Syriac (J. H. Hill ed., 1910), and a Lat. version from the Greek of about 546, numerous anc't quotations, etc., enable us to reconstruct it to some extent. See T. Zahn, *Tatian's Diatessaron*, 1881; G. Bardy, 'Tatian', in *Dictionnaire de Théologie Catholique* (Vacant-Mangenot), Vol. XV, 1946.

Tatius, Achilles, see under ACHILLES

TATTUS.

'Tatler', jour. pub. twice weekly in London between April 1707 and Jan. 1711. Sir Richard Steele (q.v.) first pub. this jour., writing for it 'The Lucubrations of

Isaac Bickerstaff,' Addison (q.v.), who discovered the identity of the author at the eighteenth ed., became a contributor thereafter.

'**Tatler and Bystander**,' weekly illustrated jour. pub. in London, estab. in 1840 and incorporating the *Tatler*, 1801, and *Bystander*, 1803. It deals mainly with contemporary events in the social, sporting, and theatrical world.

Tatra Mountains, see under CARPATHIANS.

Tatsienlu, see KANGTING.

Tatta, tn of E. Pakistan, some 60 m. SE. of Karachi on the R. Indus. T. was a great city of the turbulent rulers of Sind until 1740, when with the collapse of the Mogul Empire new Sindh rulers founded new cities, notably Hyderabad. T. is now a small place, but there are impressive remains of its former greatness, including a notable mosque.

Tattersall's, name of the firm estab. in 1766 by Richard Tattersall for the purpose of selling horses by public auction. It transferred from Hyde Park Corner to Knightsbridge Green in 1865. At the present moment T. offices are in Hay Hill, Berkeley Square, W.1, while the Knightsbridge offices are being rebuilt. To-day large bloodstock auctions are held at Park Paddocks, Newmarket, and at Glasgow Paddocks, Doncaster, at fixed times annually.

Tattersall's Committee is in no way related to the above; it is an authority set up to settle all questions relating to bets, wagers, or gaming transactions on horse-racing. It has the power to report defaulters to the Jockey Club. The Jockey Club take no cognisance of any disputes or claims with respect to bets, but if any defaulter is reported to them by T., the defaulter is warned off by the Jockey Club until the report is withdrawn.

Tattershall, small tn of Lincs, England, 8 m. S. of Horncastle. Its first charter was granted in 1201; its famous castle, built in 1440 by Ralph, Lord Cromwell, is one of the finest and earliest examples of E. Anglian brick-work in England. It was restored and bequeathed to the National Trust in 1926 by Lord Curzon. The par. church, formerly a collegiate church, was begun by Ralph, Lord Cromwell, and completed by William of Waynefleet. Pop. 600.

Tatting, see CROCHET.

Tattoo (Dutch *tap toe*, literally 'tap shut,' meaning the time of closing public-houses) is the signal, by drum-beat or bugle, for soldiers to return to their quarters at night, just before 'lights out.' The word is also applied to a kind of military pageant consisting of spectacular evolutions with musical accompaniment, performed at night by artificial light. Best known of these is the annual search-light tattoo at Aldershot in June.

Tattooing, custom of marking the skin with incisions which are filled with a colouring matter to produce an indelible stain. T. was practised by Palaeolithic man, and figurines from the SE. European Neolithic cultures have been found which

are covered all over with spiral decorations. Among the Thracians it was a sign of rank. Caesar mentions the painted bodies of the Britons, and the Picts may have received their name from their practice of painting or T. The custom must have been widespread in prehistoric times. In later periods it was used mostly for identifying convicts and slaves. In the Brit. Army, until 1876, the letters B.C. = bad conduct, and D. = deserter, were still tattooed on soldiers. Now in civilised communities it survives only among certain sections of the pop., mostly sailors, as ornament, but it can be used to disguise birth-marks, or even to remove them, a neutral-coloured pigment being injected to obliterate any discoloration of the skin. Its origin lies in the desire to heighten personal attractions or else to make the individual look more terrifying in war. Among primitive peoples it is often part of the initiation ceremonies at the time of puberty. Some peoples tattoo only on the face, others on the back, chest, arms, and thighs also. In Polynesia it has been brought to a fine art. It is done with a sharp bone with the end cut into teeth, which is dipped in a solution of charcoal or cinnabar to produce black or red markings respectively. The tattoo lines follow and accent the features.

Tauber, Richard (1892-1948), Austrian-born Brit. singer and composer, b. Linz. He studied music at Frankfurt-am-Main and Freiburg, and trained as a conductor for about 2 years. In 1913 he made his first appearance as a singer in opera, in Mozart's *Magic Flute*, but later turned to operetta. He appeared in *The Land of Smiles* in London in 1931. He became a Brit. subject in 1940. See life by Diana Napier Tauber, 1949.

Taucha, Ger. tn in the dist. of Leipzig, 6 m. NNE. of Leipzig (q.v.). It was an important tn in the Middle Ages, and has engineering and chemical industries. Pop. 17,000.

Tauchnitz, Christian Bernhard Freiherr von (1816-95), Ger. publisher, nephew of Karl Christoph Traugott T. (q.v.), b. Schleinitz. He founded in 1837 a printing and publishing house in Leipzig, which became more famous than that belonging to the senior branch of the family. He began his library of Brit. and Amer. authors in 1841. This library at one time numbered over 5000 vols. In 1868 he began the collection of Ger. authors, and in 1886 the Student's Tauchnitz eds. appeared. He was ennobled in 1860, and made a Saxon life-peer in 1877.

Tauchnitz, Karl Christoph Traugott (1761-1836), Ger. printer and publisher, b. near Grimma, Saxony; he estab. a printing business in Leipzig in 1796 and a publishing house in 1798. His special pubs. were stereotyped eds. of the Gk and Rom. classics, but he also printed Bibles and dictionaries. His son, *Karl Christian Philipp T.* (1798-1884), carried on the business, and left money for philanthropic purposes.

Tauler, Johann (c. 1300-61), Dominican friar and mystic, b. Strasburg. He came

under the pietistic influence of Master Eckhard of Cologne, and showed the devotional fervour of the 'Rhine mystics' at its purest and most perfect. His *Sermons*, full of mystical devotion and practical piety, were printed at Leipzig in 1498. There is a modern ed. by E. Hugueny and L. A. Corlier (Paris), 1928-35. See G. Bouer, *Das Predigerkloster in Basel*, 1233-49, 1935.

Taunton: 1. Municipal bor., markt tn, co. and assize tn of Somerset, England, 30 m. N.E. of Exeter, 45 m. S.W. of Bristol. It is situated in the heart of the fertile valley of T. Deane, and is sheltered on the N. and S. by the Quantock and Blackdown Hills. St Mary Magdalene par. church is a stately Perpendicular 15th-cent. building, noted for its double aisles and monuments and for its fine tower. Other buildings of note are a 12th-13th-cent. leper house or leper hospital; Priory Barn, sole relic of an important 12th-cent. Augustinian priory; and Gray's Almshouses (1635). T. castle is a Norman and Edwardian building and stands on the site of a Saxon fort. It contains the Great Hall in which Judge Jeffreys held his 'Bloody Assize.' Part of the municipal buildings originally housed the 16th-cent. grammar school, now known as King's College. T. is an agric. centre. Manufs. include shirts, collars, and other textiles; leather goods; gloves; aeronautical instruments; agric., mining, and other machinery; and cider. It is the seat of a suffragan bishop. T. existed in Saxon times, and had a mrkt before the Conquest, receiving its first charter in the reign of Stephen, though its last charter of incorporation was not granted until 1877. During the Civil war T. was held for Parliament, and later in the same cent. it witnessed the proclamation of Monmouth as king, and the brutalities of Judge Jeffreys and Kirke's 'lambs' (it was from the signboard of the White Hart Inn, now a shop, that Col. Kirke hanged Monmouth's rebels). The bor. is part of a co. constituency which returns 1 member to Parliament. Pop. 34,660.

2. City of Massachusetts, U.S.A., in Bristol co., of which it is the co. seat. It manufs. cotton goods, machinery, textiles, stoves, machine parts, oilcloth, pottery, and plastics. It is about 30 m. from Boston. Pop. 40,109.

Taunus, range of hills in the *Land of Hessen* (q.v.), German, lying between the Rhine, Main, Lahn (qq.v.), and Wetter. The slopes are well forested, are known for their vineyards in the S., and have mineral deposits. There are many spas, including Wiesbaden and Naheim (qq.v.). See NIEDERWALD.

Taunus Mountains, range of hills in the *Land of Hessen* (q.v.) in Germany, lying between the Rs. Rhine, Main, and Lahn (qq.v.). The chief summits are the Grosser Feldberg (2890 ft) and the Kleiner Feldberg (2715 ft.). They are well wooded, and the lower slopes are particularly fertile; the vineyards produce such famous wines as Ridesheimer and Hochheimer. In the N. of the region there are mineral deposits; and there are

well-known spas, including Homburg, Wiesbaden, and Naheim (qq.v.).

Taupo, lake of N. Is., New Zealand, situated in the centre of the is. The chief riv. flowing out of it is the Waikato, while near its shores are volcanoes. It is a famous trout-fishing centre. Pop. 2842.

Tauranga, tn and harbour of North Is., New Zealand, on the Bay of Plenty. Pop. 9574.

Tauria, medieval name of the Crimea. It is locally used to denote also the adjacent part of the mainland bordered in the N. by the lower Dnieper, a steppe lowland, rich agric. region belonging to Kherson and Zaporozh'ye Oblasts. See also ASKANIA-NOVA.

Taurica Chersonesus, **Tauric Chersonese**, or **Tauric Peninsula**, see CRIMEA.

Taurine (C₂H₇NSO₃), amino ethyl sulphonic acid, a crystalline substance produced in the decomposition of bile.

Tauromenium, see TAORMINA.

Taurunum, see ZEMUN.

Taurus, range of mts in the S. of Asiatic Turkey extending from the R. Euphrates to the Aegean Sea. Portions of the range are known by different names, as Aladagh, Bulgar-Dagh—the height ranging from 800 to over 10,000 ft. In the Anti-Taurus, a N. spur of the T. proper, is Mt Argæus, the loftiest peak in Asia Minor.

Taurus, or the Bull, second sign of the zodiac (q.v.), which the sun enters on 21 April, contains the 2 well-known clusters, the Pleiades and the Hyades, the former being embedded in nebulous matter. The well-known Crab nebula is also in this constellation, and the bright star Aldebaran (q.v.). Amongst other interesting objects in T. are the stars ζ and λ, the former a spectroscopic binary with a period of 138 days and the latter an eclipsing binary like Algol, the period being 3.9 days. Ross studied the Hyades cluster and showed that the motion of its stars was convergent. The average distance from the earth of the stars in this cluster is 120 light-years.

Taus, see DOMAZLIČE.

Tautog, or Black Fish (*Tautoga onitis*), food fish which occurs off the Atlantic coast of N. America. It averages from 12 to 14 lb. and is much valued in Amer. fish markets.

Tautology (Gk *tauto*, the same, *legein*, to say) is the employing of superfluous words that are in the same grammatical relation, and thus differs from pleonasm (q.v.). Needless iteration is seen in phrases such as 'free, gratis, and for nothing,' 'the shortest and nearest way.' Sometimes, however, what appears to be tautology expresses different shades of meaning, as in Pope's lines:

'Oh happiness! our being's end and aim!
Good, pleasure, ease, content, what-e'er thy name.'

See also FIGURE OF SPEECH.

Tautomerism, or **Dynamic Isomerism**, in chem., the phenomenon exhibited by various substances that appear to have 2 different constitutions. Thus ethyl

acetoacetate in some of its reactions appears to have the constitution

$\text{CH}_3\text{CO}\cdot\text{CH}_2\text{COOC}_2\text{H}_5$, while in others its behaviour corresponds to the formula

$\text{CH}_3\text{C}(\text{OH})\cdot\text{CH}\cdot\text{COOC}_2\text{H}_5$. It has been shown that substances exhibiting T. are usually equilibrium mixtures of the 2 tautomeric forms. Both forms of ethyl acetoacetate have been isolated by Knorr.

Tavel, see RHONE WINES.

Tavern (Lat. *taberna*, booth, hut, from same root as *table*), house where wines and other excisable liquors are sold and where accommodation is given to travellers or parties. T.s existed in England as early as, if not before, the 13th cent. By an Act of 1284 they were ordered to be closed at curfew. In Edward III's reign 3 only were allowed in London: in 'Chepe', 'Walbrok', and Lombard Street. By Edward VI (1552-3) 40 were allowed in London, 8 in York, 6 in Bristol, 4 each in Cambridge, Canterbury, Chester, Exeter, Gloucester, Hull, Newcastle-on-Tyne, and Norwich; and 3 each in Colchester, Hereford, Ipswich, Lincoln, Oxford, Salisbury, Shrewsbury, Southampton, Westminster, Winchester, and Worcester. Among famous T.s (ancient and modern) are the Chequers Inn, Canterbury (q.v.); the 'Bear and Billet', Chester; the Bull Inn, later called the George Inn (pulled down in 1808), York; the 15th-cent. Maid's Head Hotel, Norwich; the 'Great White Horse', the 'Coach and Horses', and many others, Ipswich (q.v.); the Lion Hotel and the now vanished Talbot Hotel, Shrewsbury; the Old George Hotel mentioned by Pepys, Salisbury; the 'Saracen's Head', Lincoln; the Mermaid Tavern (q.v.), which formerly stood in Cheapside; the Tabard Inn, Southwark, from which Chaucer started his pilgrims; and 'Ye Olde Cheshire Cheese' (or 'Chop House') in Fleet Street, London. For the law of T.s see INNS AND INNKEEPERS; LICENCES AND LICENSING LAW.

Taverner, John (c. 1495-1545), composer, b. Tattershall or Boston, Lincs. In 1526 he vacated a benefice in the collegiate church of Tattershall to become choirmaster at Cardinal College, Oxford (later Christ Church). He was imprisoned for heresy in 1528 and left Oxford about 1530. The rest of his life was spent at Boston, where he d. His works include 8 masses, of which *The Western Wynde* is the best known, though the *Missa sine nomine* is probably finer. He also wrote motets, services, etc. See E. H. Fellowes, *Tudor Church Music: Appendix*, 1948.

Tavernier, Jean Baptiste, Baron d'Aubonne (1605-89), Fr. traveller, b. Paris of Protestant parents, and began his career as a traveller in 1631, when he went to Turkey and Persia. During succeeding years he travelled much in the E., visiting Persia, Syria, and India. Finally he travelled through Batavia, and returned via the Cape. He pub. his famous *Six Voyages* in 1676. See study by Foret, 1886.

Tavilah, see QISEM.

Tavistock, mkt tn and urb. dist. of Devon, England, 15 m. N. of Plymouth, on the R. Tavy. It forms one of the gateways to Dartmoor. It is connected with the Tamar by canal. Known as the 'Gothic Town of the West,' it has sev. fine buildings, chief amongst which are the par. church of St. Eustachius (14th-cent.) and the guildhall. There are also the remains of an abbey, founded in the 10th cent., which was granted to the Russell family at the time of the Dissolution by Henry VIII. Part of this now constitutes a public library. T. is an agric. centre. An annual 'Goose Fair' is held under royal charter granted by Henry I in 1105. T. forms part of a co. constituency. Pop. 6173.

Tavoliere, see FOGGIA.

Tavoy, seaport and cap. of T. dist., Tenasserim, Lower Burma. 30 m. from the mouth of the Tavyay R. It is in a rice-producing region, and tin and wolfram are mined. Pop. (tu) 37,700; (dist.) 212,000. Area of dist. 5308 sq. m.

Tavy, riv. of Devon, England, rising on Dartmoor and flowing into the Tamar.

Taw, riv. of Devon, England, rising on Dartmoor and flowing into Bideford Bay. Length 50 m.

Tawe, riv. of Wales rising in the Black Mt. in SW. Breconshire. It flows through Glamorgan and enters the Bristol Channel at Swansea. Length 36 m.

Tawney, Richard Henry (1880-), historian, b. Calcutta, and educ. at Rugby and at Balliol College, Oxford, where he was a fellow from 1918 until 1921. He was prof. of economic hist. at London Univ., 1931-49. T. has been closely connected with the Workers' Education Association, being a member of its executive from 1905 until 1947, and its president from 1928 until 1944. His pub., *Religion and the Rise of Capitalism*, 1926, estab. him as the spokesman of a new school of thought on the growth of modern capitalist society. Other pub. include *The Agrarian Problem in the Sixteenth Century*, 1912, *Land and Labour in China*, 1931, and *Beatrice Webb*, 1945.

Tax Reserve Certificates, see INCOME TAX.

Taxation, the method of raising the revenue required for public services through compulsory levies.

General Principles of Taxation. There have been 3 schools of thought on the purpose of T. The first was that T. should be designed solely to raise the revenue required by the expenditure authorised in the Budget. The second was that T. should also be used to promote social justice and equality. In Britain, Lloyd George was the first to use T. as an instrument of social reform. The two wars, with the necessity for raising higher revenue and need for 'equality of sacrifice' by the whole pop., left no other choice but to design T. in conformity with the prevailing ideas of social equality. The Second World War especially brought a redistribution of incomes, and through income tax and surtax extinguished very high incomes considered as antisocial. With the increase of public expenditure

(and the consequent need for permanent high T.) the third school emerged. This is that T. should be used as an instrument of general economic policy in order to contribute to general stability (in addition to the traditional means of monetary policy) or to achieve specific aims. Examples are maintenance of high rates of income tax at periods when inflation is threatened and levy of higher rates of purchase tax on goods which would be particularly suitable for exports.

Economists are still discussing the 4 canons set out by Adam Smith on the standards by which the quality of a tax should be judged. These are: (1) equality—the subjects of the State should contribute to the support of the State as nearly as possible according to their ability; (2) certainty, not arbitrariness; (3) convenience of payment; (4) economy of collection.

Classification of Taxation. Taxes can be classified according to a number of different principles, e.g. the tax base (land tax, income tax, etc.), the regularity of levy (income tax to be paid annually, special contribution from capital only once). The distinction between direct and indirect taxes (e.g. between income tax and purchase tax) relates in practice rather to the method of collection than to incidence.

A central problem of the theory of T. is that of *incidence*. If the gov. collects a tax on cigarettes from the manufacturer, the amount of the tax can, to an extent depending on the 'elasticity' of demand, be passed on to the consumer. This *shifting* of the tax may take place from the original payer to someone else either once (e.g. the rates from the landlord to the tenant of a dwelling), or through a whole chain of economic relationships (from the tobacco manufacturer to the wholesaler to the retailer to the consumer). The *incidence* of the tax is on that group which cannot shift it farther. Taxes which are levied on large classes of the pop., e.g. income tax, cannot be shifted.

A further problem is the economic effect of T. Too high profits and income tax may act as a discouragement to enterprise. Too high rates of income tax on wages or a sudden steep rise after a certain amount of income may act as a discouragement to the worker, who does not feel it worth while to work overtime if he has to pay to the State a large part of his additional earnings. The 1955 Royal Commission on T. arrived at the opinion that high tax on the salaries and incomes of professional and business men did not have much effect on their normal activities, although it might affect their willingness to undertake additional work. It admitted, however, that it was too soon to reach a conclusion. The fact that high T. has been accompanied by economic expansion and enterprise in the post-war world is no evidence that it does not deter effort. The post-war generation grew up with certain *habits* of work. There is no certainty that these habits will not change under the impact of high T. At some point the new generation will prefer leisure to highly taxed income which

produces only a few shillings out of each additional pound earned. And the tendency for young people to emigrate suggests that lower T. in other countries exerts a powerful attraction.

Licence revenue obtained as the result of an ann. tax on the right to use a certain commodity (e.g. a wireless receiving set) may be classed as a direct tax, whereas a tax on enjoyment or consumption may be classed as indirect if the impact and incidence fall on different parties. Taxes such as the Brit. entertainment tax imposed in 1916 or the purchase tax on certain articles imposed in 1940 fall in this second class, but there is no distinction in kind between a periodical tax on the continued enjoyment of a commodity while it remains in use and a tax on its enjoyment in the form of a once-for-all tax paid at the time of its purchase. Modern economists therefore make a truer distinction between (1) income and capital taxes on the one hand, and (2) outlay taxes on the other. T. in the first category includes: (1) taxes on net incomes which are progressive as they allow liability to be adjusted in accordance with ability to pay; (2) taxes on profits; and (3) capital taxes, strictly a levy on capital, but estate and succession duties are also included under this head. The second category—outlay taxes—includes taxes on commodities. An outlay tax is a tax on consumption assessed either on the value of the commodity or in the form of a licence. When assessed on the value of the goods the tax is either *ad valorem*, i.e. related to the selling price, or specific, i.e. reckoned in accordance with quantity. Outlay taxes in the U.K. are generally specific in character. The 'property tax' or tax on the ownership of real estate, although allied to income tax, is strictly an outlay tax, and similarly, when assessed on the occupier or tenant in the form of rates, the tax is analogous to the licence for the use of a commodity.

Post-war T. in Britain as a proportion of the national income was higher than in any other W. industrial country. Public expenditure (central and local gov. and national insurance funds) reached 40 per cent of the national product after the war. It fell to some 33 per cent in the middle 1950's mainly because the national product increased.

See also CUSTOMS DUTIES; ESTATE DUTY; EXCISE DUTIES; INCOME TAX; LAND TAXES; LOCAL GOVERNMENT FINANCE; PUBLIC REVENUE; RATES AND RATING.

See W. J. Blum and H. Kalvin, *The Uneasy Case for Progressive Taxation*, 1953; Colin Clark, *Welfare and Taxation*, 1954; U. K. Hicks, *British Public Finances*, 1954; Hugh Dalton, *Public Finance*, 1955.

Taxation Grants, Local, see LOCAL GOVERNMENT; LOCAL GOVERNMENT FINANCE.

Taxation of Costs, see COSTS.

Taxation of Land Values, see LAND TAXES.

Taxicab, see CAB; HACKNEY CARRIAGE.

Taxidermy, art of preparing the skins of vertebrate animals so as to give them the

appearance of life and preserve their characteristics as nearly as possible. The art began to be practised in the 16th cent., and the Sloane collection, which formed the nucleus of the natural hist. collection at the Brit. Museum, was made in the early 18th cent. Skinning must be done with great care, as if the skin is flayed off there is great difficulty in restoring its proper proportions. A bird is opened under the wing. If opened on the breast, the bowels may be cut into, and a white breast spoiled. After the body is removed measurements are taken. While the skin is inside-out it is painted with a preservative soap. In making a skin, the head is filled with tow before being turned through the neck, and with this material a false body is then constructed by wrapping the tow round a piece of wire. This is put into the skin, and while drying any irregularity is corrected. 'Setting up' may be done by wiring and filling in with fine wood wool. Another method is to retain the skeleton and, after freeing it from flesh and washing it with carbolic acid, to work over it with tow or clay to produce a shape like that of the body. With larger birds and most mammals an alternative method is to prepare a mould of plaster by arranging the hardened carcase in a suitable attitude. When the mould is dry paper casts are made by pressing a series of layers of paper into the mould, so that when the model is properly mounted and prepared the skin can be drawn over it. After setting up, the specimen is painted over with a solution of 50 grains of bichloride of mercury in a pint of methylated spirit as a protection against the ravages of insects. With the exception of grasses, mosses, and dried leaves, real natural objects should be excluded from the 'mounting,' as they are almost certain to harbour insects. The highest art of the taxidermist falls with flesh, for shrinking and shrivelling of the skin cannot be avoided. A more satisfactory method is to take a cast as soon as possible after capture, and make an exact model in plaster. See J. Rowley, *Taxidermy and Museum Exhibition*, 1925; J. W. Moyer, *Practical Taxidermy, a Working Guide*, 1953; R. Wagstaff and J. H. Fidler, *The Preservation of Natural History Specimens*, Vol. 1, *Invertebrates*, 1955.

Taximeter, instrument for use in a hired vehicle, as a motor cab, for automatically showing the fare due. Grüner of Magdeburg invented the modern T. in 1895. The name 'taxi' for a motor cab is derived from this apparatus. The T. records the fare by a combination of time and distance. It is operated from the gear-box of the vehicle by a flexible cable, and comprises in its essentials a clock-winder, a gear-box, and, attached to the latter, a meter which registers the time and distance. The meter is set in operation by moving a 'flag' bearing the words 'For Hire' from the vertical position (in some meters the 'flag' arm is replaced by a lever, the movement of which sets the meter in operation).

Taxing Master, see **COSTS**.

Taxodium, genus of deciduous coniferous trees. *T. distichum*, the deciduous cypress, is a tall tree often grown in Britain, bearing cones about the size of a walnut; the trunk is usually very thick and the base is often swollen, while knees or hollow protuberances rise from the roots when the tree grows in swampy soil. The timber is of considerable value. Other species include *T. heterophyllum*, the Chinese water pine, and *T. mucronatum*.

Taxonomy, the study or science of classification; the classification of plants and animals into taxa, or groups or categories embodied in the International Codes of Botanical and Zoological Nomenclature. See **CLASSIFICATION**, **PLANT**.

Taxus, see **YEW**.

Tay, riv. and firth of Scotland. It rises on the borders of Argyllshire in the Grampians, and flows first of all in a N.E. direction and then at the confluence of the Tummel in a S.E. direction. It flows through Perthshire and its estuary forms the div. between the cos. of Angus and Fife. Its chief tribs. are the Tummel, the Braan, the Almond, and the Earn. The Earn joins it at its estuary. The total length of the riv., including the firth, is 115 m. It is crossed at Dundee (q.v.) by the famous T. Bridge. Part of the first bridge, opened in 1878, was blown together with a train passing over it, into the riv. in 1879. The present T. Bridge was completed in 1887. The chief port is Dundee, but the riv. is navigable as far as the ft. of Perth. The total area of the T. basin is nearly 2500 sq. m. It is famous as Scotland's most important salmon riv. and is the longest in Scotland.

Tay Loch, lake (15 m. long and 1 m. wide) of Perthshire, Scotland, one of sev. found in the course of the R. Tay, and not very far from its source before it joins the Tummel. There is good fishing in the loch.

Tayabas, see **QUEZON**.

Taylor, Alan John Percival (1906-), historian, b. Ashton-on-Ribble, and educ. at Bootham School and Oriel College, Oxford. As fellow and tutor in modern hist. at Magdalen College, T. became known for his authoritative studies of Ger. and Austrian 19-cent. constitutional hist. He is known to a wide public through his broadcast and television appearances. His pubs. include *The Habsburg Monarchy, 1815-1918*, 1941, *The Course of German History, 1945*, *The Struggle for Mastery in Europe, 1954*, and *Bismarck*, 1955.

Taylor, Ann, see **TAYLOR, JANE**.

Taylor, Bayard (1825-78). Amer. author, b. Kennett Square, Pennsylvania. He was apprenticed to a printer, but spent much of his life in travel, visiting among other countries, Mexico, Egypt, India, China, Japan, and Scandinavia, and writing about them in *Views Afoot*, 1846, and *El Dorado*, 1850. He pub. sev. novels, of which the best is *Hannah Thurston*, 1863, and some poems and plays, but his reputation rests mainly on his trans. of Goethe's *Faust*, 1871, one of the best attempts of its kind. See study by R. C. Beatty, 1936.

Taylor, Brook (1685-1731), mathematician, b. Edmonton, Middx, entered St John's College, Cambridge, in 1701. He became a fellow of the Royal Society in 1712, and its secretary in 1714. In 1716 he went to Paris and had an enthusiastic reception from the Fr. savants. He returned to England in 1717, and resumed his studies, but was forced by declining health to resign his secretaryship in 1718. His *Methodus Incrementorum* and a *Treatise on Linear Perspective* were pub. in 1715. The former contains the proof of his well-known theorem by which any function of a single variable can be expanded in powers of it. See FUNCTION.

Taylor, Sir Henry (1800-86), dramatist, b. Bishop Middleham, Durham. In 1824 he became a clerk in the Colonial Office, where he remained for 48 years. He devoted his leisure to writing, and in 1828 produced a tragedy, *Isaac Commens*, which was a failure. This was followed by *Philip van Artevelde*, 1834, which was a great success. In recognition of his official labours, T. was in 1869 created K.C.M.G. His *Autobiography*, privately printed in 1877, was pub. in 1885. See study by J. B. Bilderbeck, 1887.

Taylor, Jane (1783-1824), and **Taylor, Ann** (1782-1866), poetesses, b. London, daughters of an engraver. In 1804 the 2 sisters collaborated in *Original Poems for Infant Minds*, which went through 50 eds. *Rhymes for the Nursery* followed in 1806, and in 1810 *Hymns for Infant Minds*, which went through 100 eds. Among Ann's most famous pieces are 'My Mother' and 'Meditations on Matty', while Jane is best remembered as the author of 'Twinkle, Twinkle, Little Star.' See H. C. Knight, *Life and Letters of Jane Taylor*, 1880.

Taylor, Jeremy (1613-67), divine, b. Cambridge and educ. at Gonville and Caius College, Cambridge, and Univ. College, Oxford. He took holy orders in 1634. His sermons attracted the attention of Laud, who interested himself in T., and sent him to Oxford, where he was elected to a fellowship at All Souls in 1636. He became chaplain to Laud and shortly afterwards was appointed one of the king's chaplains. In 1643 he was made rector of Overstone, and 2 years later was taken prisoner by the Parliamentary forces at Cardigan Castle. He settled at Golden Grove, Carmarthenshire, and wrote his well-known works, *The Liberty of Prophecy*, 1646 (a noble and comprehensive plea for toleration), *The Rule and Exercises of Holy Living*, 1650, and *The Rule and Exercises of Holy Dying*, 1651. His more formal treatises include *An Apology for Authorised and Set Forms of Liturgy*, 1646, *The Worthy Communicant*, 1660, *The Rite of Confirmation*, 1663, and *Ductor Dubitantium, or The Rule of Conscience*, 1660, the subtleties of his works, and intended as a handbook of Christian ethics. After the Restoration he was appointed Bishop of Down and Connor and made vice-chancellor of Dublin Univ., and was also made 'administrator' of the diocese of Dromore; but his desire for an

Eng. bishopric was never gratified, though his claims for such preferment were incontestable. T. was also appointed a member of the Irish Privy Council. His tenure of the Irish bishopric was apparently unhappy: T.'s strict episcopalianism and extremely High Church views made him unpopular among his clergy and his Irish Protestant congregations. T. was one of the most literary of churchmen, and his books are still regarded as among the masterpieces of theological literature. His prose style had a nobility and passion which invites comparison with that of Bossuet. He was a brilliant scholar of the late Renaissance period, but his writing is distinguished not only by its logic, but by its imagination, purity, and complete sincerity. His works were first collected by Bishop Reginald Heber in 1822, and these were revised by C. P. Eden, 1847-52. The *Poems and Verse Translations* were ed. by A. B. Grosart, 1870. See lives by T. S. Hughes, 1831; E. Gosse, 1904; W. J. Brown, 1925.

Taylor, John (1580-1653), commonly called the 'Water-Poet', b. Gloucester. He became a waterman and achieved notoriety by a number of eccentric journeys, notably the voyage from London to Queenborough in a paper boat, described in *The Praise of Hempseed*, 1620, and the journey from London to Edinburgh on foot, told of in his *Penniless Pilgrimage*, 1618. His works were reprinted by the Spenser Society (1868-78). See R. Southey, *Observations on Uneducated Poets*, 1831.

Taylor, Rachel Annand (1876-), poetess, b. Aberdeen, daughter of J. W. Annand. Educ. at Aberdeen Univ., she married Alexander C. Taylor in 1901. Her first pub. vol., *Poems*, 1904, was followed by *Rose and Pine*, 1908, *The House of Fiametta*, 1909, a sonnet sequence, and its sequel *The End of Fiametta*, 1923. Her prose works include *Leonardo the Florentine*, 1927, *Renaissance France*, 1930, and *Dunbar and his Period*, 1931.

Taylor, Rowland (d. 1555), Protestant martyr, b. Rothbury, Northumberland. He became chaplain to Cranmer in 1540, and incumbent of Hadleigh, Suffolk, in 1544, becoming archdeacon of Exeter in 1552. He was one of the first to suffer martyrdom in Mary's reign, and was celebrated as the ideal of a Protestant par. priest.

Taylor, Tom (1817-80), dramatist, b. Sunderland. Educ. at Glasgow and Cambridge, he was prof. of Eng. Literature in London Univ. from 1845 to 1847. From 1854 to 1871 he was secretary to the Local Gov. Board. He was the author of about 100 dramatic pieces, original and adapted, including *Still Waters Run Deep*, 1855, *Our American Cousin*, 1858, and *Lady Clancarty*, 1871. He was also a large contributor to *Punch*, which he ed. from 1874 till his death.

Taylor, Zachary (1784-1850), twelfth President of the U.S.A., b. Orange co., Virginia. He entered the Army in 1808, and distinguished himself in sev. engagements against the Indians. After the

annexation of Texas, he resisted the Mexican invasion, winning the battles of Palo Alto and Resaca de la Palma and seizing Matamoros and Monterey, and later gained the memorable victory over Santa Anna at Buena Vista in 1847. On his return he was elected President (1848) as a Whig, just at the time when the struggle over the extension of slavery had begun, but he d. during the compromise of 1850. Though a Southerner and slave owner, he declared in favour of the admission of California as a state where slavery would be forbidden.

Taylor, city of Williamson co., Texas, U.S.A., 35 m. N.E. of Austin. The chief products are cotton and dairy produce. Pop. 9100.

Taylor Institution, Oxford, for the study and teaching of medieval and modern languages in the univ. It was planned 1839-45 and was designed by Cockerell, being provided for in the will of Sir Robert Taylor (1714-88). The building was inspired by Cockerell's study of the temple of Apollo at Bassae; there have been many additions to it since 1890, and it has received further endowments. There are lecture-rooms and one of the finest language libraries in England.

Taylor's Theorem, see FUNCTION.

Taymyr, peninsula in N. Siberia, between the Kara Sea and the Laptev Sea. Cape Chelyuskin (77° 43' N.) is the northernmost point in Asia. Together with the adjacent mainland and islands T. peninsula forms the *T. National District* of the Krasnoyarsk Kray, estab. 1930. Area 316,700 sq. m., pop. (1956) 34,000, mostly Russians, also Yakuts and Samoyeds. Nickel, copper, uranium, and coal are mined; other activities include fishing, reindeer raising, and fur trapping. The cap. is Dudinka. It is an area of labour camps and rapid economic development. See also NOBIL'SK.

Tay-ninh, cap. of prov. of the same name, 55 m. N.W. of Saigon, Cochinchina. Rice is the prin. product, but there are also rubber plantations. T. is the H.Q. of the Cao-dai religion (q.v.), and is noted for its architecturally remarkable Cao-dai cathedral and statuary.

Tayport, or Ferry-Port-on-Craig, burgh in the co. of Fife, Scotland, on the shore of the firth of Tay, 3½ m. ESE. of Dundee. It has foundries, engine works, and timber yards, and linen and jute are manufactured. Pop. 3400.

Tayshet, tn in the Irkutsk Oblast of S. Siberia, important junction on the Trans-Siberian Railway (branch T.-Lena), 360 m. N.W. of Irkutsk. Pop. (1910) 17,000. It is the admin. centre of forced-labour camps along the T.-Lena railway, where extensive riots took place in 1954.

Tbilisi, see TIFLIS.

Tehad, see CHAD, LAKE.

Tchaikovsky, Peter Ilyich (1840-93), Russian composer, b. Kamsko-Votinsk, was taught music early at home, but in 1850 entered the School of Jurisprudence in St Petersburg, and in 1859 became a clerk in the Ministry of Justice. He had studied music as an amateur with Zarembo and A. Rubinstein, but in 1862

decided to take it up professionally and entered the Conservatory. In 1865 N. Rubinstein appointed him prof. at the Moscow Conservatory. He met Balakirev in 1868 and accepted his advice, but did not join his circle or subscribe to its exclusive nationalist attitude: technically his music remained cosmopolitan, although it often has a distinctly Russian flavour because his individuality is Russian. His early operas, the first 2 symphonies, and the piano Concerto in B flat minor had won him recognition by 1875, and the following year a wealthy widow, Nadezhda von Meck, offered him financial support on condition that they should never meet. In 1877 he married Antonina Miliukov, who had sent him a declaration of love, out of compassion and without returning her feelings, with disastrous results. He had a serious breakdown and left her for ever within a month of the wedding. After some months in Switzerland and Italy he resigned his post and settled in a country house. In 1888 he made his first international tour, in 1892 he visited the U.S.A., and in 1893 England. After a performance of the 'Pathetic' Symphony in St Petersburg he drank a glass of unboiled water and d. there of cholera. Of his 11 operas *Eugene Onegin*, 1879, and *The Queen of Spades*, 1890, both based on Pushkin, have remained in the world repertory, and so have the ballets *Swan Lake*, 1877, *The Sleeping Beauty*, 1890, and *The Nutcracker*, 1892. Three of the 6 symphonies and the first of the 2 piano concertos are also permanent favourites, but there is much else that remains characteristic and valuable, such as the symphonic poems *Romeo and Juliet*, *Francesca da Rimini*, and *Hamel*, the *Capriccio italien* and *1812 Overture*, the violin Concerto and the Trio for violin, cello, and piano. The church music and secular choral works are rather tied up to their Russian words, but many of over a hundred songs remain attractive, and there is much that deserves to be remembered among as many piano pieces. See M. Tchaikovsky, *Life and Letters of P. I. Tchaikovsky* (Eng. trans.) 1906; E. Evans, *Master Musicians*, 1935; G. Abraham (ed.), *Tchaikovsky: a Symposium*, 1946.

Tsheboksari, or **Tsheboksary**, see CHEBOKSARY.

Tcheka, see CHEKA.

Tchekov, see CHEKHOV.

Tchelyabinsk, see CHEL'YABINSK.

Tcheremkhovo, see CHEREMKHOVO.

Tcherapovets, see CHEREPOVETS.

Tcherkesses, see CIRCASSIANS.

Tchernigov, see CHERNIGOV.

Tchernyshevsky, see CHERNYSHEVSKIY.

Tchigirin, see CHIGIRIN.

Tchikhatchev, Peter Alexandrovich (1812-90), Russian geographer and geologist, b. Gatchina. He became an attaché to the Russian embassy in Constantinople in 1842. While holding that position he made sev. journeys through the Turkish dominions, and recorded his observations in a series of geographical and geological books.

Tchimbkend, see CHIMKENT.

Tchirpan, see CHIRPAN.

Tchistopol, see CHISTOPOL'.

Tchitcherin, see CHIKHERIN.

Tcholu, see CHOLU.

Tchuvashes, see CHUVASHES.

Tczew (Ger. Dirschau), tn of Poland, in Gdansk prov., on the Vistula (q.v.), 20 m. SSE. of Gdansk (q.v.). It has a trade in timber and cereals, and manufs. bricks, agric. machinery, and beer. Pop. 23,000.

Te Anau, lake in Otago, S. Is., New Zealand, largest of the lakes in the S. Alps. It has a maximum length and breadth of 40 m.

Te Deum Laudamus, well-known non-metrical Lat. hymn, found in the Rom. breviary at the end of Matins, and also used by the Rom. Catholic Church on occasions of rejoicing. There has been much discussion on its origin, and modern scholars have shown that it consists largely of borrowings from older sources. Its present form is probably due to Niceta, Bishop of Remesiana (d. c. 414). There are 20-30 Eng. versions including one by Dryden. An Eng. form is also used in the Anglican Communion at Matins.

Tea, beverage used since a remote period in China, but unknown in England until 1657. Though it at once attracted great interest, it was obtainable only by wealthy people until about 1750. At first it was infused and kept in barrels, being drawn like beer, and warmed for use. In 1660 a tax of 1s. 6d. was imposed per gallon of liquid tea, but in 1680 a tax of 5s. per lb. was substituted. Since 1852 when the tax was 2s. 2d. per lb. it has been down to 4d. in 1890, and has 5d. just before the First World War. In 1929 the duty of 4d. on foreign and of 3½d. on empire T. was repealed. The duty was reimposed in April 1932, the rates for foreign and empire teas being 4d. and 2d. respectively. These have since been altered from time to time. Consumption in Britain in 1956 was 10.1 lb. per head of the pop.; of this about two-thirds is Indian T. The first shipment of Indian T. was made from Assam in 1839. T. is derived from *Camellia sinensis*, which is indigenous to Assam and China. The young leaves and shoots (the 'flush') are picked from the bushes by women. After gathering they are taken to the factory, spread thinly over wire or bamboo trays, and placed on wire or hessian racks to wither, after which they can be rolled without breaking. The length of time required for withering depends on climatic conditions, the shortest time being about 12 hrs. and the average 24 hrs. During the wet seasons, and in specially humid areas, the leaves are withered by artificial heat. The next process, that of rolling, is done entirely by machine so far as general commercial production is concerned. It causes the juice to be exuded, and it imparts to the leaf the twist characteristic of its manufactured state. The leaf is then spread out thinly in the fermenting room, where the air is kept moist, and there in a few hrs it changes from green to copper colour. It is then 'fired' by being spread on trays which pass through a hot-air chamber.

After being sorted or classified, a process carried on in modern factories by machinery, the T. is then packed for export.

In making T. the water should be fresh and freshly boiled, and after pouring over the T. should be allowed to stand for 3-5 min., when the T. should be poured off the leaves. More than half the T. exported from T.-producing countries is consumed in Great Britain and N. Ireland. In relation to imports the next largest consumers—outside the producing countries—are the U.S.A., Australia, and Canada. After the outbreak of the First World War internal troubles and national poverty greatly changed the ability of Russia to purchase this beverage, but in theory, at all events, Russia remains one of the great T.-drinking nations. During recent years T. has gained increased popularity in the U.S.A. Until the beginning of the Second World War, London was the chief T. market of the world, and the prices at the London sale-rooms estab. values in every country, with the possible exception of China. This results from the fact that Chinese T. is marketed in a different way from the T. of other lands, the purchases being usually made in China on behalf of importers instead of the T. being exported to London and elsewhere for sale by auction. But even in the case of China, prices were largely influenced by results in the London sale-rooms. The Eng. T. trade was, however, temporarily disrupted by the impact of war. Before the war China was the largest T. producer in the world, but although reliable information is no longer available, production is thought to have declined by a third since that time. Even before the war, India, Ceylon, and Indonesia had gradually supplanted China as the world's chief source of T., and they now contribute more than three-quarters of the total production. In 1955 world production was at the record level of 672,000 metric tons—50 per cent above pre-war. The largest proportionate increases in production have occurred in E. Africa, and some 20,000 metric tons now come from this area each year. In other countries production in thousands of metric tons was: India and Pakistan 324.8, Ceylon 172.4, Japan 70.0, and Indonesia 48.4. To regulate exports of T. from the major producing areas the International Tea Agreement was signed in April 1933 and renewed in 1933 and 1950. It expired in 1955, and unfortunately negotiations for its renewal have been hampered by fundamental economic disagreements. So far this has not had any serious repercussions on the T. trade. T. trade has always interested the Brit. merchant and investor, and many of the best tea gardens of the E., particularly in India and Ceylon, are controlled by Brit. companies. Much also of the continental T. trade is Brit. For maté or Paraguay T., see MATÉ.

See O. Lancaster, *The Story of Tea* (new ed.), 1947; R. D. Morrison, *Tea—Its Production and Marketing* (revised), 1948; *Tea: a Progressive Industry, 1950—*all pub. by the Tea Centre.

Tea Rose, *see* ROSE.

Tea Seed Oil is commercially produced in China from *Thea sasanqua*, cultivated for its seed. Tea plants *Thea sinensis* and *Thea japonica* are cultivated for their leaves at the expense of the seed, and yield less than 10 per cent of the commercial T. S. O. The seed kernel of *Thea sasanqua* contains 56-60 per cent of oil, which is yellow to brown and may have a very biting, unpleasant taste. It refines to a pale yellow oil with very little taste and odour, resembles olive oil in both chemical and physical characteristics, and is used mainly as a salad and frying oil. Only low-grade oil is used for soap making. Component fatty acids of the oil are: saturated—6-12 per cent; unsaturated, oleic, 74-87 per cent, and linoleic, 2-15 per cent. The cake remaining after extraction of the oil has astringent properties and cannot be used as cattle food; it has limited use as an insecticide.

Teaching, *see* EDUCATION.

Teak, Asiatic timber tree growing in various countries, though the wood is provided chiefly by the true teak, *Tectona grandis*, a species of the family Verbenaceae. It reaches a great height and bears panicles of small white flowers. The wood is deep yellow to dark brown or almost black in colour, that of the mixed deciduous forests of Burma being the darkest and that of Siam the lightest. It grows also in India, Ceylon, Malaya, and Java. The T.s of India include the 'Deccan', which is probably the darkest 'Indian T.' and most ornamental, the colour being deep brown with handsome figuring. T. is the most valuable timber in Burma, yielding a large part of the country's revenue. Before the Second World War, for many years the Brit. forest returns showed that 450,000 tons of T. were produced annually ('ton' in this context has no reference to weight; it means a cub. ton of 50 cub. ft.). There are such large quantities of this timber in Burma that, provided the forests are properly managed, the extraction of 450,000 tons a year is not wasting any of the capital value of the forest; it is merely removing the natural increment. As far as freedom from movement is concerned, T. is superior to all other woods. Its primary use is in shipbuilding, where the essential oil contained in it has the desirable quality of non-corrosion of the metal fittings, the metal decks on which it lies, and the bolts that stay it down. T. is of great value for railway carriages, and outdoor use. The *Cutty Sark*, famous tea clipper of the 1860's, was built of Burmese T. and was still afloat in 1914. T. is also much used for cabinet-making. *See* D. J. Atkinson, 'Forests and Forestry in Burma,' in *Journal of the Royal Society of Arts*, 2 July 1948. *See* FORESTRY; TIMBER.

Teal (*Anas crecca*), kind of small freshwater duck. The male, in general colour, is dusky grey; tail-feathers ashy grey; crown of head deep cinnamon or chestnut; the eye is surrounded by a black band, glossed with green or purple, which unites on the nape; wing markings black and white; bill black and resembling that of

the widgeon. The female is mottled brown. Total length 14-15 in.

Teallach, An ('The Forge', after the smoke-like mists around its peaks), range of 14 Torridon sandstone mts in W. Ross-shire, Scotland, extending N. and S. for 3 m. on the S. side of Little Loch Broom. The highest top is Bidean a' Ghlas Thuill (3483 ft.).

Tear Gas, lachrymatory irritant, usually consisting of a mixture of chloro-acetone, ethyl-bromo-acetate, benzyl iodide, iodo, and benzyl bromide. It causes an immediate stinging pain in the eyes and tears, but does not injure the eyes unless liquid or solid gas enters them, when the effects are serious. It was used first as a military weapon by the Germans during the First World War. It is used for civil purposes, i.e. by police for the dispersal of rioters, though its military use was prohibited by the Geneva Protocol (1925).

Tearle, Sir Godfrey (1884-1953), actor, son of a famous Shakespearean actor, Osmond Tearle, played his first dramatic part at the age of 9. A handsome man of fine presence, he possessed a magnificent voice and played many parts, having a considerable range of talent. He was certainly one of the best Othellos of his period, and had he possessed a more forceful personality might have become the leader of his profession. He was knighted in 1951.

Tears, secretion of the lachrymal gland. *See also* EYE.

Teasdale, Sara (1884-1933), Amer. poetess, b. St. Louis, Missouri. After extensive travel in Europe and the Near E. she settled in Chicago, where she met Vachel Lindsay, whose suicide in 1931 was a great shock to her. In 1914 she married Ernest P. Fiskinger; they were divorced in 1929. As a poetess she excelled in lyric verse, her earliest influence being Christina Rossetti, with whom she has been compared. Vols. of her poetry include *Sonnets to Duse*, 1907, *Helen of Troy*, 1911, *Rivers to the Sea*, 1915, *Love Songs*, 1917, which was awarded the Columbia University Prize, *Flame and Shadow*, 1920, *Dark of the Moon*, 1926, and *Strange Victory*, 1933. Her *Collected Poems* were pub. in 1937.

Teasel, or Teazel, *see* DIPSACUS.

Teate, *see* CHIETI.

Tebessa (anc. Theveste), tn in Algiers, in the dept. of Constantine, famous for its Rom. ruins. It is the place where St Crispin suffered martyrdom and, situated at the junction of the roads to Carthage, Cirta, Lambessa, and Tacapa (modern Gabes), soon became a place of the first importance, not only from a military but also from a commercial point of view. T. is assumed to have been founded about AD 71, just after the Jewish war. It was probably one of the first tns to adopt Christianity after its introduction into Carthage, AD 150, and many famous bishops ruled over the Church there. Its period of greatest splendour was the commencement of the 2nd cent., and from that time there began the construction of its finest monuments. Later it was razed by the Vandals and disappeared from hist.

until its restoration by the Byzantine armies, Solomon being its second founder. The modern town, which is contained within the walls of the Byzantine citadel, is 11 m. from the Tunisian frontier and N. of the mts of Bon Rouman. One of the most interesting of its Roman ruins is that of the great basilica, originally a temple of Minerva. There is also an enormous circus and a triumphal arch. Near T. are some important phosphate quarries. In the Tunisian campaign of the Second World War, in Rommel's assault of Feb. 1943 at the Kasserine Pass, T. figured as an important road junction guarding a gap through the last lines of hills to the Algerian plains, but the allied heavy artillery and bombers checked his thrust some 20 m. from T.

Tebeth (Esther ii. 16), tenth month of the Jewish calendar (or fourth month from Tishri, q.v.), corresponding to Dec.-Jan.

Technical Education, a term used to describe courses of instruction, in a variety of institutions, in subjects directly applicable to the purposes of agriculture, industry, trade, or commercial life. A distinction is sometimes made between T. E. and commercial education (q.v.). In its limited sense T. E. is provided for 3 categories of personnel. Technologists, who make a scientific study of the practical or industrial arts, have a univ. degree or some comparable qualification, are usually eligible for membership of one of the professional institutions, and are expected, in their careers, to accept a high degree of responsibility and initiate advances in their own field. Technicians, whilst specialists by virtue of their theoretical and practical training, usually require a good knowledge of the mathematics and science related to their speciality. They work under the general direction of technologists, and in the factory would occupy such positions as assistant designers, or junior managerial positions, for example, in industrial workshops. Craftsmen represent the skilled labour of manufacturing industry, and account for a high proportion of its manpower. Each category has its appropriate qualifying examinations—degrees, technical diplomas, and certificates. In the U.K. these awards are made by a variety of bodies—univs., technical colleges, the Ministry of Education through its National Certificates, the City and Guilds of the London Institute, Regional Examining Unions, and other professional and trade organisations. Commercial education includes subjects such as accountancy, book-keeping, costing, shorthand, typing, and so on (see COMMERCIAL EDUCATION).

Since T. E. in the U.K. developed piecemeal, courses are offered in a great variety of institutions. Apart from the univs. there are over 500 technical or commercial establs. in England and Wales. These include Polytechnics, Technical Colleges, Technical Institutes, Colleges of Technology, Art, and Commerce, Colleges of Commerce, Colleges of Further Education, the seven National Colleges of technology—Horology, Foundry, Rubber Technology, Heating and Ventilating,

Leather, Food Technology, Aeronautics, and the Royal College of Art. Nearly three-quarters of the students attend evening courses; most of the rest are released by their employers to attend courses under the day-release scheme; a few are in full-time attendance. Industry co-operates in T. E. through 'sandwich' courses—substantial periods of full-time study are alternated with periods of industrial training. This kind of arrangement is appropriate at various levels.

Within the secondary-school system in England and Wales there are a number of technical schools (see EDUCATION) which provide a general secondary education with an increasing technical bias in the later years of the course. It is probable that these schools will send on an increasing number of their pupils to further technological training. It is likely that the 5 per cent of the age group who attended them in 1955 will be raised in an attempt to meet the national demand for technically trained personnel. This demand has been emphasised in a series of Gov. Reports since the Second World War (e.g. the Barlow Report 1944, the Percy Report 1945, and Technical Education Report 1956), and the number of technically trained personnel in the U.K. compared unfavourably with other countries, particularly the U.S.A. and U.S.S.R. See P.F.R. Venables, *Technical Education*, 1955.

Technicolor, leading colour process employed in modern cinematography. The first T. films were made about 1926: a special lens and filters were used to obtain a 2-colour image, which was based upon the principles known as the additive process. This was later abandoned when the 2-colour subtractive process was introduced, which was followed by the 3-colour subtractive process, the system now employed. The T. 3-colour camera photographs the 3 primary aspects of a scene (red, green, and blue) upon 3 separate film strips, simultaneously, at normal speed, without fringe or parallax, in balance, and in proper register with each other. These separate strips are developed to negatives of equal contrast and are always considered and handled as a group. From these colour-separation negatives, printing is carried out by projection through the celluloid upon a specially prepared stock, which is then developed and processed to produce positive relief images in hardened gelatin. These 3 reliefs are then used as printing matrices which absorb dye. The dye is then transferred by imbibition printing to another film strip, which, when it has received all 3 transfers, becomes the completed print ready for projection. This process is designed to reproduce whatever is placed in front of the camera, not only as to colour, but also as to light and shade.

The T. process reproduces a full scale of contrasts and effects of light and shade, and consequently the designer of settings has to bear in mind the cameraman's problem of achieving the necessary light-levels with a minimum number of sources

of illumination. T. adds few complications to sound recording, but the 'whistle' from the arcs caused by high-frequency ripples in the electric current coming from the commutators of direct-current generators must be eliminated. This is done by the combination of an alternating-current filter at the generator and additional choke-coils at the individual arc units. Modern film production, Amer. and Brit., has proved that, used imaginatively, colour heightens dramatic effect. Some experts believe that colour will eventually supersede black-and-white photography altogether in film-making.

Technology (Gk *technē*, art or craft), body of knowledge relating to arts and crafts. It includes the hist. of the development of productive arts, the scientific principles underlying them, and descriptive accounts of processes employed in them.

Technology, Imperial College of Science and, see IMPERIAL COLLEGE.

Teck, Ger. family whose name was taken from a castle of Württemberg. Francis, a prince of Württemberg, who became Duke of T., married Mary Adelaide, daughter of the Duke of Cambridge, and settled in Britain. He died on 20 Jan. 1900, and his wife on 27 Oct. 1897. Their issue was a daughter, Mary, who married King George V, and 3 sons: Adolphus, Duke of T. (1868-1927), eldest brother of Queen Mary, who married a daughter of the first Duke of Westminster and was created Marquess of Cambridge in 1917; Francis, who died in 1910; and Alexander, created Earl of Athlone in 1917. In the latter year the family name was changed to Cambridge, when that of Guelph was changed to Windsor (q.v.).

Tedder, Arthur William, first Baron of Glenguin (1890—), Marshal of the R.A.F., educ. at Whitgift School and Magdalene College, Cambridge. He entered the colonial service in 1914. Commissioned in 1914 in the Dorset Regiment, he went to France in 1914 and was seconded to the Royal Flying Corps in 1916. He was given a permanent commission in the R.A.F. in 1919. He held sev. important posts and became air officer, commanding-in-chief Middle East, 1941-3. He became air commander-in-chief, Mediterranean air command, in 1943. T., appointed deputy supreme commander under Gen. Eisenhower for the Anglo-Amer. expeditionary force, was the first Brit. airman to assume so important a military post. He was a specialist in strategy, moulding to his own shape the current ideas on air co-operation with armies. He relinquished the post of chief of the air staff at the end of 1949 at his own request in order to facilitate the advancement of younger officers. T. was promoted marshal of the R.A.F. in 1945. He was knighted in 1942 and created a peer in 1946.

Teddington, tn of Middx, England, on the N. bank of the Thames, since 1937 part of the bor. of Twickenham. The manor of T. belonged to the abbey of Westminster until the Dissolution. The

National Physical Laboratory and the Chemical Research Laboratory are in T. It is the highest tidal point on the riv., and its famous lock (built 1811) is the largest (650 by 25 ft) on the Thames. T. is the point where the discharge is gauged, and is the frontier of the respective jurisdictions of the Port of London Authority and the Thames Conservancy Board.

Tees, riv. of England, rising in Croos Fell, Cumberland, and flowing SE. and then NE. for 70 m., forming the boundary between Yorks and Durham and entering the estuary called T. Mouth to join the N. Sea. It is navigable to Stockton-on-Tees. The riv. valley, known as Teesdale, includes Mickie Fell (2591 ft), the highest point in Yorks, and the great waterfall of High Force; among the fells near the riv.'s mouth are found alpine flowers.

Teeth, calcareous structures occupying the alveolar processes of the upper and lower jaw, and serving to tear, cut, or grind food.

In man there are 32 permanent T., 16 in each jaw. They are divided as follows: 2 incisors, 1 canine, 2 premolars or bicusps, and 3 molars in each lateral half of each jaw. The incisors have chisel-shaped crowns, and are therefore adapted for dividing food by cutting. In the upper jaw they are socketed in the pre-maxillary bone. The canine T. are conical in shape, and are therefore adapted for piercing. In carnivorous animals they are developed as sharply pointed T., which serve to tear the prey. The canines are borne behind the junction of the maxillary and pre-maxillary bones. The premolars have somewhat flattened crowns and bear 2 cusps, 1 external and 1 internal. The first premolar has sometimes 2 roots, though, like the canines and incisors, it usually has a single root. The molars, the largest and firmest T., are placed behind the bicusps. Those of the upper jaw have 3 or 4 cusps, while the lower-jaw molars have 4 or 5. The upper molars have usually 3 roots each, and the lower molars 2 roots each. The last and smallest molar is known as the 'wisdom tooth.' The arrangement of the T. of any mammalian species is best summed up in a dental formula. Thus the formula for man, $\frac{2.1.2.3}{2.1.2.3}$, indicates that there are 2

incisors, 1 canine, 2 premolars, and 3 molars in each lateral half of the upper and of the lower jaw. In man the structure of all the T. is essentially the same. The outer layer is composed of enamel, a hard substance consisting principally of calcium phosphate and smaller amounts of calcium carbonate, magnesium phosphate, and calcium fluoride. The next layer is composed of dentine, which contains the same mineral substances as the enamel with the addition of organic matter. Dentine is hard, though not so hard as enamel; it forms the greater part of the bulk of the tooth, and is furnished with a series of fine channels by which communication is estab. between its substance, the enamel, and the dental pulp. The dental pulp is contained in a cavity

within the dentine. It consists of blood-vessels and nervous matter. The root of the tooth is devoid of enamel, but possesses a coating of 'dental cement,' a bony layer which is adjacent to the periosteum of the alveolar cavity. The permanent T. in man are preceded by temporary or 'milk' T. These are fewer in number, smaller in size, and whiter in colour than the permanent T., and they are also somewhat different in shape, the roots of the molars, in particular, being more divergent than corresponding structures in permanent T. The process of their development is usually over by the end of the second year. The permanent T. develop from the fifth year to the twentieth year.

Dental caries is a common disease affecting the human race. The cause of the disease is the presence of bacteria in the mouth which bring about fermentative changes in starchy or carbohydrate food by which lactic acid is produced. The acid disintegrates the enamel coating, after which other bacteria cause putrefactive changes in the organic matter of the dentine, leading to a breaking down of the tooth structure, inflammation of the pulp, and the consequent distressing pain known as toothache. The baneful effects upon general health resulting from defective T. can be successfully obviated only by recourse to the methods of dental surgery. Pyorrhoea (q.v.) also has markedly ill effects on general health. T. should be cleaned before retiring, on rising, and after every meal, by brushing up and down, and to and fro.

Dentistry. This is the dept of medical science which treats of the care of the mouth, particularly of the T. The work that falls to the dentist is mainly comprised under the heads of dental surgery, mechanical dentistry, and dental prophylaxis, or the general prevention of T. diseases. Dental surgery includes all measures for the treatment of unsound T. and the correction of deformities and irregularities of the T.; mechanical dentistry deals with the manuf. and adjustment of artificial substitutes for T. The dental surgeon and the surgeon work in collaboration in the treatment of fractured jaws and in the field of plastic surgical treatment of deformities of the face due to disease or injury. Considerable advances have been made in mechanical dentistry, and strong, light plastic materials and acrylic resins have superseded the older materials in the making of dentures. The art of dentistry has been practised from very early times. In the 19th cent. much progress in dental science is particularly associated with the names of Blake, Fox, and Bell in England; Fonzi, Cuvier, and Bertin in France; and many able scientists and practitioners in America. In 1878 the profession was regularised in England by an Act which estab. a register, the conditions for registration being put in the hands of the General Medical Council. The position was further regularised by the Act of 1921, according to which all persons practising dentistry had to be registered,

the penalty for an unregistered person practising being a fine not exceeding £100. The term dental surgeon is strictly reserved to those who possess the qualification of L.D.S. or are otherwise professionally qualified. Under the Dental Act, 1956, a General Dental Council was set up which will in future assume all the functions previously exercised by the General Medical Council in relation to dentistry. The licensing corporations are the Royal Colleges of Surgeons in England, Scotland, and Ireland, and the Royal Faculty of Physicians and Surgeons of Glasgow. See also NATIONAL DENTAL SERVICE. See J. B. Parfitt and W. E. Herbert, *Operative Dental Surgery* (7th ed.), 1955.

Teges, tn of Arcadia in anct Greece. Named after its reputed founder, Tegates, son of Lycaon. In its earliest days it was closely associated with Sparta, but after 371 BC became independent. The tn was famous for its temple of Pallas Athene (394 BC). Considerable excavations have been made on its site.

Tegernsee, Alpine lake in the Land of Bavaria (q.v.), 27 m. S. by E. of Munich (q.v.). It is a popular tourist resort and sporting centre. Length 4 m.; width 1 m. The vil. of T. on the E. shore of the lake has a castle (once a Benedictine abbey) belonging to the Duke of Bavaria. Pop. 4500.

Tegnér, Esaias (1782-1846), Swedish poet, b. By, Värmland. He studied at Lund Univ., and in 1802 became lecturer in philosophy there. In 1811 he pub. a patriotic ode, *Sege*, which was crowned by the Academy, of which he became a member in 1818. He pub. in 1820 *Nattvardens barnen* ('The First Communion'), in 1822 *Axel*, and in 1825 *Frithiofs Saga*, a paraphrase of an Icelandic saga. He was also a critic of considerable ability. In 1812 he had been ordained, and in 1824 he was made Bishop of Växjö. T. is regarded as one of Sweden's greatest poets. Although bred in the classical tradition, he was much influenced by the Romanticism of Schiller. T.'s finest passages, whether inspired by love, patriotism, politics, or philosophy, display great originality of thought, and a blending of the new Romantic style with the Scandinavian saga heritage. Among his best poems, besides those mentioned, are *Song to the Sun*, 1817, *The Candidate for Confirmation*, 1820, and *Degree Day at Lund*, 1820. See M. Gravier, *Tegnér et la France*, 1942; F. Böök, *E. Tegnér* (2 vols.), 1946-7.

Tegucigalpa, cap. of the rep. of Honduras (q.v.), situated on the R. Choluteca at the base of the old volcano E. Picacho. It is a well-built in much modernised since 1900, containing a cathedral, central univ., military and aviation schools, law courts, national museum, national printing works, tobacco and other factories. It is united by a bridge to Comayagüela on the opposite bank of the riv. Gold and silver mining is carried on in the vicinity. Its airport is at Toncontin, 2½ m. S., and the city is a fine road centre, but has no railway. Pop. 55,700.

Tehran, or **Teheran**, city and cap. of Persia. It stands 3850 ft above sea-level, about 60 m. S. of the Caspian Sea. The climate is hot during the summer, but mild during the rest of the year, with a mean daily maximum of 99° F. in July and 44° F. in Jan. The relative humidity in Jan. is 76 and in July 47. Under Shah Reza Pahlavi (1925-41) T. was to some extent rebuilt and extended on W. lines; since the Second World War it has increased in size. It is a commercial centre, and has match, tobacco, textile, cement, soap, glass, and munitions manufs. The univ. was founded in 1935, and there are a national library and a number of museums. T. became cap. of Persia, in place of Isfahan, in the 18th cent. Pop. (city and suburbs) 1,500,000.

Tehri-Garhwal, see GARHWAL.

Tehuacán, tn of Mexico, in the state of Puebla and 65 m. S.E. of Puebla city, at an altitude of 5400 ft. It is noted for its mineral springs; but it is also now a modern city with manufs. of agric. products, textiles, and chemicals, flourmilling, and tanning. It has a railway junction and airfield. Pop. 17,000.

Tehuantepec, tn of Mexico, in Oaxaca state, 12 m. up the R. T. from Salina Cruz on the Pacific coast. It gives its name to the isthmus inhab. by the Zapotecs. There are tropical agriculture and mineral resources. Pop. 7000.

Tehuantepec Winds, or **Papayagayos**, strong cold winds due to the same influence as the 'nortes' or 'northerners' of the regions round the Gulf of Mexico. They are cold, dry winds from the continent, allied to the mistral or bora of the Mediterranean. They are strong on the Mexican W. coast, but weaker on the Pacific, in Nicaragua and Guatemala, where they are known as T. W. from their direction.

Teifi, or **Teivy**, riv. of Wales, rising in Llyn Teifi, N.E. Cardiganshire. It forms the boundary between Cardiganshire, and Carmathenshire and Pembrokeshire, and after flowing 53 m. enters Cardigan Bay.

Teign, riv. of Devon, England, rising in Dartmoor, near Chagford; after flowing for 30 m. it enters the Eng. Channel at Teignmouth. Its estuary is nearly 1 m. across.

Teignmouth, John Shore, first Baron (1751-1834), statesman. He entered the service of the East India Company as a cadet at the age of 18. He rose rapidly, and was finally made a member of the Supreme Council. In 1793 he succeeded Cornwallis as governor-general of India. He retired from this office in 1797 and received his peerage on his return to England.

Teignmouth, seaport, urb. dist., and holiday resort of Devon, England, at the mouth of the R. Teign, with a sea-wall 2 m. long. T. is built partly on a tongue of land between the Teign and the sea, and partly on rising wooded ground enclosing the valley which rises to the high moors below Haytor. Pipe-clay and china clay are shipped here for the continental potteries, and fishing is

carried on. The commercial netting of salmon is practised in the Teign. The par. of Shaldon on the S. bank of the riv. is in the urb. dist. Pop. 11,000.

Tello, St, disciple of Dyfrig and founder and first abbot-bishop of Llandaff. He restored many of Dyfrig's foundations after the plague of 547. He died c. 580 and his feast is on 9 Feb. See S. Baring-Gould and J. Fisher, *Lives of the British Saints*, 1908.

Tithes. The T. of a Scottish par., like the tithes (q.v.) of Eng. law, are that proportion of rents or goods which goes to the maintenance of the clergy. The clergy, however, have now no right to T. beyond a suitable provision or stipend. Generally speaking, T., like tithes, are a burden on land, and most lands, except glebe lands and lands in respect of which the T. have been redeemed, are liable to such burden. According to canon law one-tenth of that which one acquires by one's own industry (personal T.) is due by divine right to the Christian clergy; but Scots law requires evidence of 40 years' possession of personal T. to make good a legal right to them. Predial T. are said to be either parsonage or vicarage; the former being T. of corn due to the parson or other titular of the benefice; the latter being payable to the vicar out of cattle, fowl, eggs, etc. Parsonage T., having always been an inherent burden upon all lands not specially exempt, cannot be lost by prescription; but the right to vicarage T., having always rested upon usage, can be lost 'non utendo' (non-user). After the Reformation the whole of the T. were transferred to the Crown, or to private individuals called titulars, to whom they were granted by the Crown, or to feuars or renters from the Church, or to the original founding patrons, or to colleges or pious institutions. In the reign of Charles I it was provided by arbitral decrees (subsequently confirmed by statute) that T. (up till then payable in kind) should be liable to be valued and the landowner entitled to purchase or redeem them at a certain valuation. This obviated the inconvenience of the titular or patron of T. coming on the land at his leisure and claiming the physical separation of his tenth part after harvest (though there was an alternative method of payment by 'rental-bolls'). Landowners liable to T. may also sue titulars for a valuation or for a sale of their T. T. not so valued or redeemed are still 'drawn in kind.' Predial T. are still paid in kind. The court of session (q.v.) has now taken over the whole of the jurisdiction of the old court of T.

Teith, riv. of Scotland, rising 16 m. ENE. of Inveraray, and flowing through Perthshire to join the Forth 2 m. from Stirling. Length 33 m.

Teixeira de Rascoais (1878-1952), Portuguese poet and essayist, b. Gátão, his real name being Joaquim Pereira Teixeira de Vasconcelos. His early work was lyrical in character, but later, particularly in his prose writings, he concentrated more on a metaphysical discussion of the problem of good and evil

and the progress of humanity. His pubs. include *Jesus e Pan*, 1903, *Regresso ao Paraíso*, 1912, *Santo Paulo*, 1934, and *Santo Agostinho*, 1945.

Tejo, see **TACUS**.

Tejuco, see **DIAMANTINA**.

Tel al Amarna, see **Tell el Amarna**.

Telamon, brother of Peleus, who with him slew Phocus their half-brother. T. fled from Aegius to Salamis, where he married the daughter of the king and ultimately succeeded to the throne. He was one of the Calydonian hunters and an Argonaut (q.v.). He also helped Hercules to take Troy. T. was the father of Ajax by Eriboea.

Telavi, tn in E. Georgia, 58 m. NE. of Tiflis, the centre of a famous wine-producing area (see **KAKHETIA**). It has the ruins of an anc. fortress and palace, and is surrounded by sev. monasteries and churches of the 6th-16th cents., formerly much frequented by pilgrims. T. was founded in 893, and was cap. of Kakhetia since the 17th cent. Pop. (1939) 13,000.

Tel-Aviv, tn of Israel, 48 m. from Jerusalem, provisional cap. of Israel from 1948 to 1950. Although the largest tn, as far as the number of inhab. is concerned, its area before the Second World War was smaller than that of Jerusalem or Haifa. During the war and under the Israeli Gov. the municipal boundaries were extended, so that the area is now some 10,000 ac., 4 times as great as in 1939. For this area, the pop. goal is 500,000. In 1950 it was proposed to join Jaffa to T.-A. in the near future by Act of the Knesset (Parliament). The scope of its municipal, social, and educational services and free medical aid to the poor, etc., was outstanding in Israel in 1950. T.-A. had estab. itself by 1930 as the prin. economic centre of the country. Two large textile factories were erected in 1924; this marked the beginning of steady industrial expansion in T.-A. It became famous for its sugar and chemical and pharmaceutical industries. The largest number of banks are situated here, as well as most commercial firms, newspaper offices, etc. T.-A. is also a cultural centre. All the Heb. daily newspapers are pub. in T.-A., as well as numerous periodicals. It contains the 2 best-known Jewish theatres. Other municipal buildings include a museum and an art gallery. Its main exports before 1939 were oranges. T.-A. presents, in its European modernity of style and life, a striking contrast to the Oriental character of Jaffa. The Palestine Electric Corporation has built a power-house at T.-A., and the transmission lines have been extended beyond the tn boundaries to colonies N., S., and E., and thus provide energy for lighting, industry, water supply, and irrigation.

T.-A. was founded in 1909 by a group of residents of Jaffa who decided to build for themselves a modern garden-suburb on the N. outskirts of Jaffa, and in 1910 this received its present name which means 'The Hill of Spring.' By 1914 the pop. of T.-A. was 1500, or one-fifth of the total Jewish pop. of Palestine. In addition to

the constant migration of Jews from Jaffa to T.-A., the waves of Jewish immigration into Palestine, largely absorbed by T.-A., contributed to a rapid and constant increase of its pop. By May 1921 it was given the status of an independent township gov., and after the disturbances of 1929 the last official links binding T.-A. subordinately to Jaffa were removed. No other place in Palestine has seen so rapid a development. The original quiet streets, with the first 60 small villas, soon developed into broad and busy streets, lined with large modern concrete buildings. By the outbreak of the disturbances of 1936 T.-A. had become the largest tn of Palestine, and its industrial and commercial centre. As a result of the disturbances the business community could not use the port facilities of Jaffa, and this led to the building of the T.-A. Lighter Port, which made a substantial contribution to its economic expansion. The municipality of T.-A. in 1950, with gov. approval, planned to expand this into a large permanent port. The Bar-Glan univ. was founded here in 1955. Pop. (with Jaffa) 400,000.

Telecommunications, science of communication by electrical means. See **RADIO-COMMUNICATION**; **TELEGRAPHY**; **TELEPHONY**; **TELEVISION**.

Telecontrol, Electric, the starting, stopping, and regulation of machines and operation of switchgear from a distance, sometimes of many miles, by electric current signals in a telecommunication system. The operation of a section of an interconnected network, including generating stations and distributing substations, is controlled at a central control room.

Telegonus, son of Ulysses by Circe. He was sent by her to find Ulysses. He landed in Ithaca, but was attacked by his father and Telemachus, who imagined him a pirate. He slew Ulysses not knowing who he was. He conveyed the body to Circe for burial, and later married Penelope.

Telegraphy, see **HEREDITY**.

Telegraphy, system for conveying information between 2 points. The first serviceable telegraphic device, invented by Chappe (France) in 1792, was a form of semaphore. In 1816 Ronald (England) produced his pith-ball telegraph, where an electric current to line caused 2 pith balls to diverge, and their movement exposed a character. In 1819 Oersted discovered that an electric current deflected a neighbouring magnetic needle, the direction of movement depending on the direction of current flow. Cooke and Wheatstone, applying this principle, produced the first practical electric telegraph system in 1837. Their first system was a 5-needle telegraph requiring 5 lines. This was followed by the double-needle and then the single-needle system. Fig. 1 shows the system in its simplest form. When a message is to be transmitted from A to B, the key is depressed as shown and line current flows through the recorder at B to earth and deflects the recorder needle.

Karl Steinheil (1836) devised an acoustic telegraph with 2 gongs of different notes. Line current deflected 1 of 2 needles depending on the current direction. Attachments to these needles struck the gongs, and thus gave a code of audible

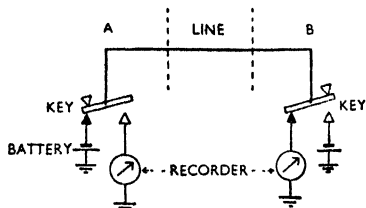


FIG. 1. PRINCIPLE OF COOKE AND WHEATSTONE ELECTRIC TELEGRAPH

signals. Alternatively, the needles were equipped with ink-holders in contact with a moving tape and recorded dots in 2 parallel lines to give the message according to a dot code. In 1837 Morse produced his electro-magnetic telegraph. The Morse code consists of 2 distinct signals in

A . —	T —
B	U . . —
C . — . .	V . . . —
D . —	W . — —
E .	X . . . —
F . — .	Y . — — —
G — —	Z — — —
H . . .	
I . .	
J . — — —	1 . — — — —
K — —	2 . — — —
L	3 . . . — —
M — —	4 —
N . —	5
O — — —	6
P . — . .	7 . — . . .
Q — — . .	8 — — . . .
R . — .	9 — — — .
S . . .	0 — — — —

FIG. 2. THE MORSE CODE

groups to define the various characters. One signal is a 'dot' and the other a 'dash,' the dash being 3 times the duration of the dot. There are intervals between the letters and a longer interval between words (Fig. 2). In the elementary Morse system the recorder at each end (Fig. 1) is replaced by a sounder (Fig. 3).

It consists of a U-shaped electromagnet M and a soft iron bar A attached to a brass bar B. The brass bar is pivoted; its free end is normally kept up by a spring S. When the signal current flows through the electro-magnet the iron bar A is attracted, the brass bar is pulled down and the screw C strikes the frame. When the current ceases, the spring pulls the bar up again and its end strikes the screw D.

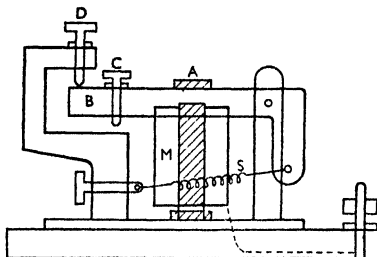


FIG. 3. MORSE SOUNDER

The receiving operator hears the 2 taps; if the interval between them is short the signal is a dot; if long, a dash. Later a number of systems were produced where the dots and dashes were ink recorded on a paper tape. Galvanometers are included at each direct-sounder station to enable the operator to verify that the key operation is actually causing current to flow to line.

The direct-sounder system can be used only over short lines. On longer lines the sounder is replaced by a relay which requires a much smaller operating current.

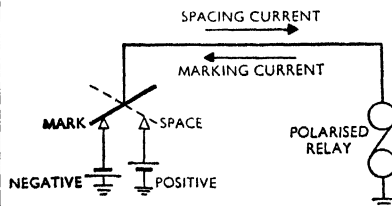


FIG. 4. DOUBLE-CURRENT WORKING

The relay contacts complete a local circuit to operate the sounder.

The single-current working so far described involves signal distortion and requires a slow signalling speed to prevent interference. In double-current working the interval between the signal (mark) currents is filled by currents (space) flowing in the reverse direction. The effect is to accelerate the discharge of the line (Fig. 4). This method is used extensively on long submarine cables. The cable code is similar to the Morse code, except that the dots and dashes are distinguished by direction of current flow.

They appear as punched holes in a paper tape, and the 2 signals are readily distinguished by their relative positions on the tape. This method permits a greater signalling speed.

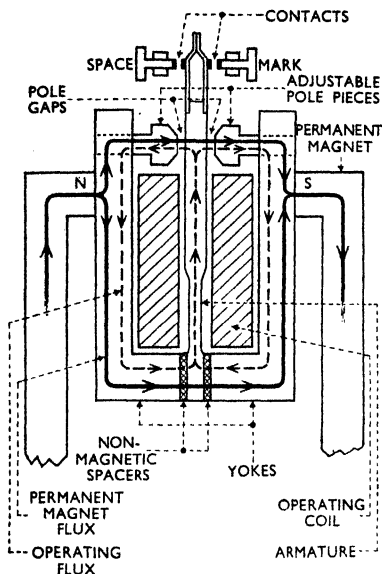


FIG. 5. POLARISED RELAY

Double-current working requires a receiving relay of the polarised type, operating in one direction to the mark, and in the reverse direction to the space currents. Fig. 5 shows a modern type

broken by non-magnetic spacers. The pole pieces are 2 permalloy screws. The armature contacts play between 2 contact screws. The relay is polarised by a permanent magnet, the poles of which are in contact with the yoke at the point where the pole pieces pass through it. The coil is wound on a bobbin which is slipped over the armature, but does not touch it. The permanent magnet produces 2 poles in each half of the yoke, at the pole pieces and at the spacers. The coil magnetises the armature. The paths of the polarising and operating magnetic fields are shown by the solid and dotted lines respectively. These fields aid and oppose each other at the respective pole piece and spacer gaps. With the direction of the fields shown, the armature operates to the right (mark position); reversal of the coil current would cause the armature top to move left (space position).

In simplex working (Fig. 6), as here described, operation is only possible in one direction at a time. To increase the traffic-carrying capacity of circuits, duplex working is used. This permits the simultaneous transmission of signals in both directions on the 1 line. Two simplex circuits, 1 in each direction, may be combined to give duplex facilities (2-way simplex). Differential duplex is often used on inland networks.

The Bridge duplex, used on submarine cables, is based on the principle of the Wheatstone Bridge, and depends for its action upon the balance of potentials across a relay connected in the diagonal of the bridge. The line-signal conditions give potential balance and unbalance conditions to operate the relay.

An extension of the duplex principle gives quadruplex working, a duplex system in which simultaneous transmission of 2 messages in each direction is possible over a single circuit. One message is given by the direction of current flow and the other by the actual current value.

High-speed Automatic Systems. In automatic systems (Creed, Wheatstone,

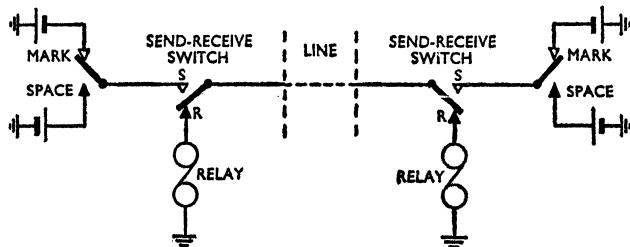


FIG. 6. SIMPLEX WORKING

used by the Brit. Post Office. The yoke, armature, and pole pieces are made of permalloy. The yoke is in 2 pieces, clamped together over the end of the armature, the magnetic circuit between the armature and the pole pieces being

Baudot) now in general use, the signals are transmitted by mechanical means. The Brit. Post Office now use the start-stop teleprinter system.

The Wheatstone automatic system (1807) is still in use to-day on submarine

cables, because of its speed superiority over teleprinter working. It is a development of the Morse system, and can work at some 300 words a minute. Three instruments are required: (1) a perforator for punching holes representing the Morse code in a paper tape; (2) a transmitter which sends out mark and space currents to line in accordance with the punched holes; (3) a receiver for recording the signals. The system may be worked simplex or duplex. The message is prepared on a paper tape, perforated according to the signals of the Morse code, the disposition of the punched holes about central guiding holes in the tape giving the dot or dash. The perforated strip is run through an automatic transmitter, which results in corresponding currents (mark or space) being transmitted to line. The receiver consists of a polarised relay with a tongue carrying an inked wheel which writes on a moving strip of paper; the message is translated by operators. In modern forms a perforator is used to produce a perforated tape at the receiving end, precisely similar to that at the transmitting end. This tape may be used to retransmit the message by passing it through an automatic transmitter connected to another circuit; or, by passing it through a suitably designed printing instrument, the message is recorded in Rom characters.

The Creed keyboard perforator eliminates the perforation of the punched holes as a separate operation. The mechanism incorporates a keyboard similar to a typewriter, and operation of the keys causes a tape to be perforated in accordance with the Morse code. Sixty words a minute can be obtained with the keyboard perforator.

The Baudot system (1874) is a multiplex printing system worked double current. It uses a 5-unit code in which each character is made up of a combination of 5 currents, each current being positive or negative. A multiplex system is a multiple-way arrangement of sending 2 or more messages over the same line by the allocation of the exclusive use of the line in rapid succession. A number of operators are given the exclusive use of the line for a time sufficient to transmit 1 character (time-division multiplex).

Signals are transmitted and received by means of segmented distributors with contacting brushes rotated in synchronism at each end of the line. The distributors enable up to 6 operators to use the line during 1 revolution of the brushes around the distributors. Assuming 6 operators, the distributor periphery is divided into 6 sections, each serving 1 operator. Each section is further subdivided into 5 segments. The rotating brushes make contact with the corresponding segments in the respective sections at the same time. Each successive segment at each end is thus in circuit with the line for the short time the brushes rest on them and, during this time, information may be passed between the 2 segments.

Start-Stop Teleprinter Working. Modern inland telegraphic communication is now carried out by teleprinters. The teleprinter consists of (1) the transmitter and (2) the receiver, which are mounted upon the 1 base and are driven by a small electric motor. The transmitter consists of (a) a keyboard, and (b) a transmitting unit, controlled by the keyboard, which transmits signals in the form of electrical impulses. The receiver part consists of (a) an electro-magnet, operated by the line signals, and (b) a mechanism which causes the character corresponding to the signals to be printed on a moving paper tape.

Modern teleprinter working uses the Murray 5-unit signal code. Here the signal time for each character is the same. Five electrical impulses of equal duration are transmitted for each character. Various formations of these impulses make up the different characters. In double-current working, space signals are positive battery and the mark negative battery. The maximum number of different characters that can be obtained is 32, and since it is necessary to transmit numerals and other characters as well as the alphabet, the machine is arranged to use the same combinations for figures as for letters. Start and stop pulses accompany every character combination. The motors run continuously, but when no signals are passing the transmitting and receiving mechanisms are at rest. When a key is depressed, both mechanisms make 1 revolution, during which time the start pulse, character combination, and stop pulse are sent. At the receiving end the start pulse sets the receiving mechanism in motion for 1 revolution. The character combination is received while the mechanism is in motion and finally the stop pulse is received. The start and stop signals obviate maintaining continuously correct phase relationship between the teleprinters at each end of the line such as is required in multiplex systems. The time for 1 revolution is approximately $\frac{1}{2}$ sec., and the system is capable of working at approximately 60 words a minute.

Where the traffic is too heavy for direct keyboard operation, automatic tape transmission may be used. The operator prepares the message, to the 5-unit code, on perforated tape. This is fed through an automatic tape transmitter which transmits the signals to line.

Repeaters. With d.c. signalling, the speed at which long circuits, having large values of capacitance and resistance, can be worked is limited. A repeater inserted in the line permits a greater speed, as the repeater effectively breaks the line up into a number of shorter links. The simple type consists of a relay receiving and retransmitting the signal to the receiving station. A regenerative repeater is one which accepts distorted signals and retransmits them free from distortion. This type has application in repeating Wheatstone signals to enable long submarine cable circuits to be extended via land lines.

Telegraph Signalling. Direct-current signals are subject to distortion. On

inland networks the modern method is to signal by a.c. in the voice-frequency range. Such signals can be passed over standard telephone trunk lines, amplified with thermionic valve amplifiers. Alternating-current signals retain their shape in transmission with sufficient accuracy almost without distance limit. The Brit. Post Office use a multi-channel voice-frequency signalling method for inland networks. In this system 18 channels are obtained on 1 line. Each channel has its own signalling frequency, which is transmitted within a narrow frequency band. The signalling bands are contained within the normal frequency band of a 4-wire telephone circuit.

Facsimile, or picture T., transmitting still pictures, or printed matter, over an electrical circuit, is now finding increasing application, particularly for press work. A typical technique incorporates a sender, which is arranged to scan the picture in a regular manner by of means a light-spot. The variations in tone of the picture are interpreted into variations in amplitude of a.c. passed to line to a receiver. Here a light from a constant source is arranged to fall on a piece of photographic material and scan this at exactly the same rate as the sender light-spot. The variation of incoming current from the line operates a light-valve, which controls the intensity of the light falling on the photographic material to reproduce the original picture. For T. systems see POST OFFICE; for submarine cables see CABLES; SIGNALING, MILITARY. See W. T. Perkins, *Telecommunications* (3rd ed.), 1948.

Telegraphy, Wireless, see WIRELESS TELEGRAPHY.

Teleilat-el-Ghassul, see under TRANSJORDAN, *Prehistory and Ancient History*.
Telekinesis: 1. For the sense in which T. is ordinarily used, see SPIRITUALISM.

2. For the physical as distinct from the psychic use of T., see TELECONTROL; see also RADAR.

Tel-el-Kebir, or Tell-el-Kebir, vil. in N.E. Egypt, on the Freshwater Canal. It owes its fame to the fact that it was the scene of Wolseley's great victory over Arabi Pasha, 13 Sept. 1882. See WOLSELEY, G. J. W., VISCOUNT.

Telemachus, son of Ulysses and Penelope, a child when his father set out for Troy. After about 20 years he set sail in search of news of him. He visited Pylos and Sparta, and returned to Ithaca in time to help his father in the famous fight with the suitors.

Telemann, Georg Philipp (1681-1767), Ger. composer, b. Magdeburg. He studied languages and law at Leipzig Univ. and was mainly self-taught in music, but in 1704 secured the appointment of organist at the New Church there and founded a students' music society, the Collegium Musicum. After various appointments at Sorau, Eisenach, Frankfurt, and Bayreuth, he became music director of the Johanneum at Hamburg in 1721 and organist at the 5 prin. churches. He travelled a good deal, and sev. times visited Berlin and in 1737 Paris. T. was one of the masters of the late Baroque period. He demon-

strated that 'rococo' music could retain a purity and an unworldliness, while possessing a rich and complex form. His works include sev. operas and oratorios, chamber music, and church music. See life by E. Valentin, 1931; also H. Hörner, *Telemanns Hamburger Passionen* 1931; K. Schäfer, *Telemanns Klaviermusik*, 1931.

Telemark, fylke of Norway, on the S. coast. It is a mountainous region, with vast reserves of timber. Skien, bp. of Ibsen (his *Peer Gynt* has its setting in T.), is the cap. Industries include timber, paper, and chemicals. T. contains some of Norway's wildest and most picturesque scenery. Of particular interest is Rjukanfoss (415 ft), one of Europe's finest waterfalls, providing power for chemical works, etc. Pop. 136,000.

Telemeter, see RANGE-FINDER.

Telemetering, measurement of physical quantities, pressure, temperature, speed, current, voltage, etc., on meters placed at a distance from where the phenomena occur that are measured, e.g. the operating characteristics of boiler plant, turbines, generators, and transformers in a power station indicated on meters in the control room.

Teleology, see KANT; HEGEL.

Teleostii, or **Teleostean**s, the largest group of bony-fishes (q.v.) consisting of about 25,000 living species. The scales and outer headbones are not faced with a shiny armouring of ganoin such as is found in most other Actinopterygii, 'ray-finned fishes', the tail is typically symmetrical (homocercal), and each half of the lower jaw is formed only of 3 bones. The more primitive orders are the herring and salmon-like fishes (Isospondyli), the pikes and mud-minnows (Haplomi), the carps, characins, and catfishes (Ostariophysii), and the eels (Apodes). These are soft-rayed fishes with the swim-bladder opening into the foregut through a tube (pneumatic duct) and typically with abdominal pelvic fins. The Iniomii (lantern-fishes, lizard-fishes, bombay duck, etc.), also soft-rayed fishes and mainly with abdominal fins, differ from the herrings and salmon group in that in the upper jaw the anterior jaw bones (premaxillae) exclude the posterior jaw bones (the maxillae) from the gape. The Syngnathii (gar-fishes, flying-fishes, etc.), the Microcyprini (toothed-carps), and the Anacanthini (cod-like fishes) are soft-rayed fishes with a closed swim-bladder. But while the pelvic fins are abdominal in position in the first 2 orders, in the cod-fishes these fins are placed below or in front of the pectoral fins. The pipe-fishes, sea-horses, snipe-fishes, etc. (order Solenichthyces), have the mouth at the end of a long, tube-like snout, the swim-bladder is closed and the pelvic fins are abdominal. A spinous dorsal fin may be present.

The other main orders of teleosts consist of spiny-finned fishes and their allies. The great group of spiny-finned fishes is the Percomorphi consisting of sev. thousand species. Spines are formed in the dorsal and anal fins, and the pelvic fins generally consist of a spine and 5 branched rays.

Included in this order are the perches, sea basses, cichlids, breams, red-mulletts, drums, butterfly-fishes, wrasses, parrot-fishes, surgeon-fishes, mackerels and tunnies, gobies, blennies, dragonets, etc. The flat-fishes (Heterosomata) are clearly related to the Percomorphi, as is the order Plectognathi (trigger-fishes, file-fishes, globe-fishes, porcupine-fishes, sun-fishes, etc.). The angler-fishes (Pediculati) have a spinous dorsal fin of a few flexible rays, the first of which is set on top of the snout and is used as a line and bait. The deep-sea angler-fishes have a luminous bait. See also BONY-FISHES.

Telepathy, name given by F. W. H. Myers to the transference of knowledge from one mind to another without the use of any normal sensory channel of communication. The reality of this power was proved in the early days of the

From time to time performances of alleged T. are shown on the variety stage. It would be rash to assert that none of these performers has T. powers, or that they never use them on the stage. On the other hand, most of these performances depend on the use of codes or other means known to conjurers. In all cases the conditions of a stage performance are altogether unfavourable for critical determination of whether genuine T. has been used. See Prof. J. B. Rhine, *The Reach of the Mind*, 1948; R. Heywood and S. G. Soul, *Telepathy and Allied Phenomena*, 1948.

Telephony, system of reproducing sounds at a distance. Credit for the production of the first practical telephone is due to Alexander Graham Bell (q.v.). In Bell's original electro-magnetic telephone, the receiver and transmitter both con-

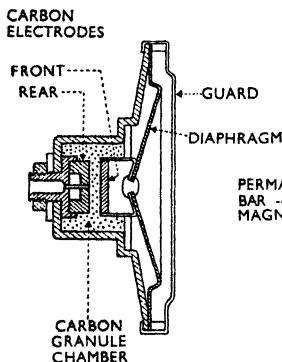


FIG. 1. MODERN INSET TRANSMITTER

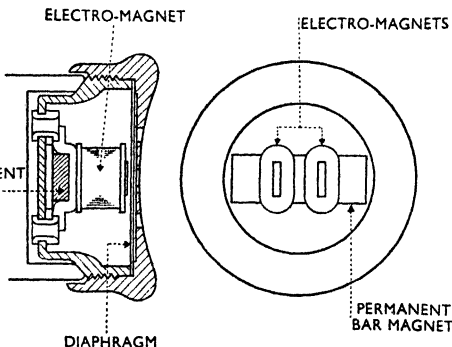


FIG. 2. MODERN INSET RECEIVER

Society for Psychical Research, but it was generally supposed to be restricted to a few exceptional individuals. The more recent work of Prof. Rhine at Duke Univ. has shown that it is much more widespread than was at first supposed, and that the paranormal acquisition of knowledge is not restricted to what is in another person's mind, since a fact not known to any other person may also be known without the use of any normal sense channel. T. is thus only one example of a more general paranormal power of obtaining knowledge often now referred to as extra-sensory perception (or the *psi* capacity). Experimental work in extra-sensory perception is commonly done by a method of guessing the order of a pack of 25 cards containing 5 each of 5 symbols, and performing a statistical analysis of the results to discover whether more have been guessed right than can be accounted for by chance. Explanations of T. by unknown radiations acting on an unknown sense organ are now generally rejected. It seems necessary to make a more radical reorientation of the theory of the way in which knowledge is obtained.

sisted of an electro-magnet with a pivoted armature connected to the centre of a flexible diaphragm. The 2 instruments were connected together with a battery in circuit. The current in the electro-magnet windings produced a magnetic flux dependent on the reluctance of the air-gap between the end of the electro-magnet and the armature. Sound-waves created by speech vibrated the diaphragm, varying the reluctance. The fluctuations in the induced e.m.f. results in fluctuating current in the circuit, and thus in fluctuating excitation of the receiver electro-magnet. In the modern transmitter (Fig. 1) two carbon electrodes, connected to a d.c. source, are immersed in a chamber filled with carbon granules. The rear electrode is fixed and the front electrode attached to the centre of a light cone-shaped duralumin diaphragm clamped round its periphery. Vibration of the diaphragm due to speech moves the front electrode, thus varying the resistance of the granules (normally about 60 ohms) and hence the current.

The modern receiver (Fig. 2) is based on the Bell receiver.

In early telephone systems (Fig. 3) local batteries supply current to each transmitter, the transformers preventing the battery current from flowing in the external line. The a.c. components of the fluctuating current in the transformer primary (P) induce an alternating e.m.f.

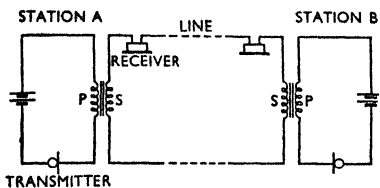


FIG. 3. LOCAL BATTERY TELEPHONE CIRCUIT

into the secondary (S) circuit, which includes both receivers and the line.

MANUAL TELEPHONE EXCHANGE SYSTEMS.

Magneto System. The speech current is supplied by local batteries and the signalling by currents generated by the subscriber operating a small electric generator incorporated in the telephone instrument.

automatic, being controlled by the removal or replacement of the receiver.

Central Battery (C.B.) System. A central battery at the exchange supplies current for both speech and signalling; the signalling is automatic (Fig. 4). The load on the exchange is divided equally among the operators, and each attends to a certain number of subscribers. The line jacks and calling lamps of each group of subscribers appear in the home section of the switchboard in front of the respective operators. The operators answer the subscribers at the home section. As each subscriber must have access to any other subscriber on the exchange, all the subscribers' lines are multiplied round the multiple section of the switchboard, so that they appear a number of times. Each appearance of all the lines in the multiple is arranged to be within arm's reach of each operator. The size of an exchange is controlled by the size of the multiple appearance accessible to each operator, and for this reason exchanges are limited to 10,000 subscribers. An operator ascertains that the required line is free or not by tapping the end of the calling plug on the required subscriber's multiple jack. If the subscriber is engaged the operator hears a click in her telephone; if free no click is given.

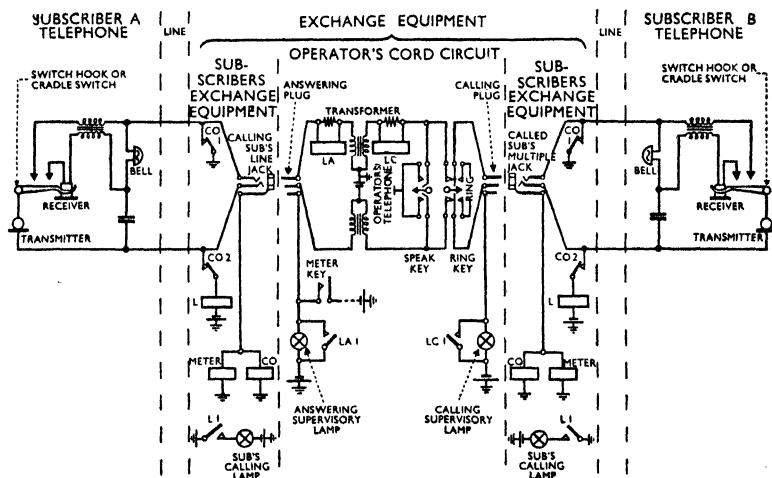


FIG. 4. CENTRAL BATTERY MANUAL EXCHANGE SYSTEM

The signalling currents operate electromagnetic indicators on the operator's switchboard.

Central Battery Signalling (C.B.S.) System. The speech current is supplied by local batteries, but the signalling current for all the subscribers on the exchange is supplied by a central battery at the exchange. The signalling is

AUTOMATIC TELEPHONE EXCHANGES. In automatic working machine equipment at the exchange completes the call without the aid of an operator. The subscriber controls the exchange equipment by the operation of a dial which is part of the telephone instrument, although a certain number of operators are still required to assist the subscriber in case of difficulty,

trunk calls, etc. All automatic systems are based on the central battery system. In 1912 the first public automatic exchange in Great Britain was opened at Epsom. This exchange was based on the Strowger step-by-step principle.

In recent years the development of automatic systems has proceeded at a rapid rate, and there are now 5 prin. systems in use: (1) step-by-step (Strowger) system; (2) panel system; (3) crossbar system; (4) rotary system; and (5) relay system. Of these the step-by-step system is most widely used and is the present standard system of the Brit. Post Office.

Step-by-step (Strowger) System. The exchange equipment consists of: (1) line switches; (2) group selectors; and (3) final selectors. The operation is controlled by the subscriber's dial, which interrupts the current from the exchange at regular intervals, depending on the digit dialled. These electrical impulses operate the group and final selectors which seek out the called line and connect the calling line to it. The selector switch used in step-by-step systems is a 2-motion type in that it is actuated first vertically and then horizontally. The switch consists of 3 main units: (1) relays; (2) contact bank; and (3) switching mechanism, including wipers, shaft, and controlling magnets. Fig. 6 shows a typical telephone relay. The magnetic

group. The shaft raises the wipers to the horizontal level and then rotates the wipers over the level to the desired contact. The lower (line) bank contains 200 contacts arranged in 10 horizontal levels, each having 10 sets of 2 contacts each. In some cases the selector has 200, instead of 100, circuits wired to the bank, and there are 3 banks, 1 private and 2 line.

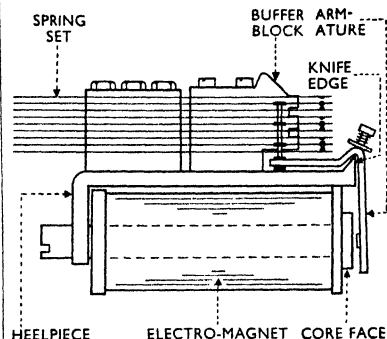


FIG. 6. MODERN TELEPHONE RELAY

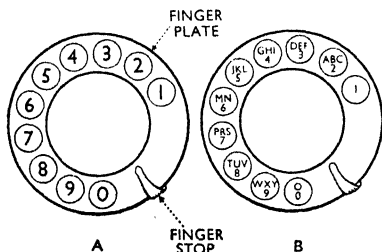


FIG. 5. DIAL

A, numbered dial; B, numbered and lettered dial. (One-third actual size.)

circuit consists of the coil core, the heel-piece, and the armature, all of good magnetic material. When a current flows in the coil the armature pivots on the knife-edge, and is attracted to the core face. The spring assembly is actuated by the armature and is arranged, by the making or breaking of the contacts, to provide the desired electrical circuit conditions.

The 2-motion switch bank consists of 2 banks (private and line) mounted at the bottom of the mechanism. The top (private) bank consists of 100 contacts arranged in 10 horizontal rows of 10 contacts each, arranged in a semi-cylindrical form so that a pair of wiper springs on the selector shaft may make connection with any contact in the 100

The corresponding bank contacts of a group of Strowger switches are multiplexed together to provide the same basic arrangement found in manual multiple switchboards. The subscriber's line is thus accessible from a number of switches.

The basic 2-motion switch mechanism consists of an electro-magnetic device that is capable of raising, rotating, and releasing a wiper-carrying shaft. The Strowger 2-motion selector consists of a central shaft carrying flexible spring wipers at the lower end. These springs make contact with the required bank contact by wiping over the level to which the shaft is raised—hence the name 'wipers.' Two notched ratchets, the vertical and rotary ratchets, are attached to the shaft. Two electro-magnets, the vertical and rotary magnets, by attracting their respective armatures, control the motion of the wiper-carrying shaft. When the vertical magnet is impulsed, a pawl engages with the vertical ratchet, and the shaft (and wipers) is stepped vertically to the bank level corresponding to the digit dialled. When the rotary magnet is impulsed a pawl engages with the rotary ratchet and the wipers are rotated horizontally over the level to the desired contact. To release the selector the rotary action is continued until the wipers disengage from the bank. In this position the shaft falls, and when clear of the bank it is turned back to its normal position by a spring.

Line Switch. The line-switch mechanism is self-actuated and is independent of dialled impulses. The wipers move round a bank of contacts in 1 direction only, and for this reason the switch is

called a uniselector. It searches for a subsequent switch wired to its contact bank. This subscriber's uniselector automatically connects the calling line, wired to its wipers, to an idle 2-motion selector wired to its bank, when a call is initiated and before the subscriber commences to dial.

Exchange Trunking. A feature of the step-by-step system is the straight-forward decimal selection. The number of selector stages required depends on the number of subscribers on the exchange. Fig. 7 shows the trunking of a 100-line exchange. As all the subscribers on the exchange can appear on the bank of a

similar arrangements of the group and final selectors shown in Fig. 8 are provided, and a rank of 1st group selectors added so that the 1st group selectors in Fig. 8 now become 2nd group selectors, the capacity of the exchange is 10,000 lines. The size of automatic exchanges is usually limited to 10,000 lines. Extension of this selector-switch stage principle permits calls to be routed from exchange to exchange, and the ultimate objective of telephone administrations is to permit any subscriber, national or international, to be called by a system of long-distance dialling.

Basic Working. When the receiver is removed the subscriber's uniselector

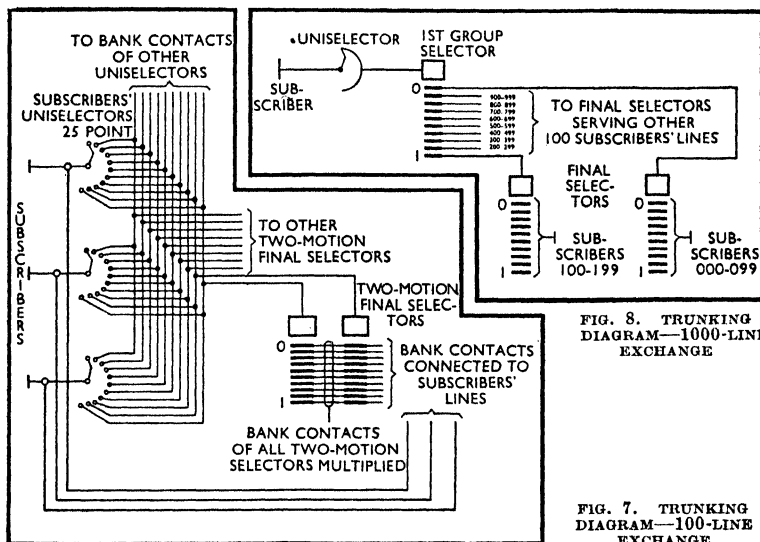


FIG. 8. TRUNKING DIAGRAM—1000-LINE EXCHANGE

FIG. 7. TRUNKING DIAGRAM—100-LINE EXCHANGE

2-motion switch only 1 selector stage, the final selector, is required. A number of selectors are multiplied together, the actual number depending on the traffic. The first (tons) dialled digit steps the final selector vertically, and the second (units) digit steps it rotary to the called line. The capacity of the exchange may be extended by additional switching stages known as group selectors, and Fig. 8 shows the trunking of a 1000-line exchange, which is regarded as consisting of 10 100-line groups. Access to a group is obtained by the additional switching stage, and 3 digits are dialled by the subscriber. The additional stage (1st group selector) steps vertically to the first (hundreds) dialled digit, and then hunts automatically over the level to find a free final selector in the particular hundreds group. The final selector responds vertically to the second (tens) dialled digit and rotary to the (units) digit. If 10

searches for and connects a 1st group selector to the calling subscriber's line. A dial tone is now transmitted to the subscriber, informing him that he may now dial. The dialled digits route the call through the sev. switching stages, and the wipers of the final selector are set on contacts to which the called line is connected. If the line is engaged, a busy tone is returned to the calling subscriber. If the line is free, the bell is rung by ringing current applied to the required subscriber's line from the final selector. At the same time a ring tone is transmitted to the calling subscriber to inform him that the required number is being rung. When the call is answered ring and ring tone are ceased, the call is automatically metered against the caller, and a speaking circuit is completed by the exchange equipment. The connection is held under the control of the calling party.

Multi-exchange Areas. In an area where the total number of subscribers does not exceed 10,000 and these are served by a number of exchanges, the traffic can be routed to the various exchanges from the 1st group selector levels.

Step-by-stop System. Director Working. The director method of working is used for the large cities in Great Britain, in a number of areas in the U.S.A., and in other countries. In such areas 'tandem' working is adopted. Each exchange must be obtained by dialling a fixed code to permit a common directory to be used throughout the area. This involves the use of equipment which will automatically change the dialled code digits into other digits appropriate to the particular routings (translation). Each exchange must have a dialling code containing the same number of digits. Each code consists of 3 digits. In director areas subscribers dial a total of 7 digits, 3 code and 4 numerical. The 3 code digits for any exchange are the first 3 letters of the exchange name, and the dial used is of the type shown in Fig. 5(B), having letters as well as figures. The directory is so printed that the first 3 letters of the exchange name stand out in heavy type capitals (CENTRAL 2345). Director equipment is provided at each exchange in a director area, and the equipment is used to direct the call to the required exchange. The director receives all the digits dialled by the subscriber, translates the 3 code digits into 2-6 digits as necessary to route the call to the required exchange, and transmits these digits followed by the 4 non-translated numerical digits. Director equipment is required only during the setting up of a call; it releases after the numerical digits have been sent and becomes available for other calls.

The Panel Automatic Telephone System. The panel system is a development of the Western Electric Company Ltd. (Bell Laboratories), U.S.A., and is primarily for use in large areas. It is fitted in many areas in the U.S.A., including New York. The system differs from the Strowger in the basic design of its switch and bank, and in the fact that the switching functions are estab. largely by motor-driven units. The use of a motor drive requires indirect control of the switching equipment by register senders. The motor-driven switch mechanism carries contacting brushes vertically upward to establish a connection with the desired vertical bank contact field. The elevating members are under the control of electro-magnetically operated clutches whose action is controlled by relays.

When the caller removes his receiver a line-finder motor-driven contacting brush is set in operation, and moves upwards into a bank of contacts to find the calling line. At the same time auxiliary equipment selects a sender and connects it temporarily to the calling line. The subscriber now receives the dial tone and dials. The dialled impulses are received by the sender and are trans. into pulses which control the operation of various selector mechanisms (called dist., office,

incoming, and final selectors) to establish a circuit through to the called line. A sender is in operation only for the setting up of the call, and then releases for use on other calls. A group of senders is common to the whole exchange. The selector frames are so arranged that as many as 500 sets of terminals can be made available to each selector.

The register sender is thus a device for translating the digits dialled by the subscriber into information to control selection through the switching stages. The device is necessary, as the panel system is not a direct-action decimal selection system under the control of the dial. The code routing digits are trans. to facilitate flexible tandem routing through the network.

The Crossbar Automatic Telephone System. The Bell Laboratories developed the crossbar system to supersede the panel system. The crossbar system is similar to the panel system in that it makes use of a sender. It consists wholly of relay type crossbar switches and multi-contact relays. Connections between the subscriber's lines are accomplished by the operation, controlled by senders and markers, of the crossbar units.

The system has a sender-marker method of control which permits apparatus, common to all the subscribers, to be used to set up the call to the required subscriber, then released prior to the speech period.

The crossbar switch consists of (1) 20 separate vertical circuit paths; (2) 10 separate horizontal circuit paths; and (3) a mechanical means for connecting any one of the 20 vertical paths to any one of the 10 horizontal paths by the operation of electro-magnets.

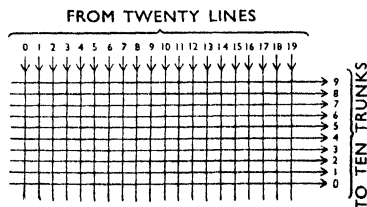


FIG. 9. PRINCIPLE OF THE CROSSBAR SWITCH

Fig. 9 shows the schematic arrangement of the switch, and 10 simultaneous connections can be estab. 1 on each horizontal path. The number of lines that can be connected to the same 10 trunks may be increased by adding other switches wired to different groups of 20 lines and connecting the horizontal contacts in multiple to other switches. The assembly of switches is called a link frame.

The Rotary Automatic Telephone System. This is used in some European and S. Amer. countries, and in some centres in the U.S.A. The switches are unselector type. The operating mechanism consists of a motor-driven shaft to which the

wipers of the sev. switches in a group are geared. The driving mechanism is placed in operation by means of an electromagnetic clutch which brings a flexible gear into temporary contact with the shaft driving gear. The register in the rotary system operates in much the same manner as the sender in the panel system. Power-driven rotary line-finder switches locate the calling line and extend it temporarily to the register. The register receives all the dialled impulses from the calling subscriber, stores and translates them, and then transmits pulses to control the operation of the subsequent power-driven numerical selecting switches to find the required subscriber's line. The selectors have a bank capacity of 200 or 300 circuits, arranged in 10 levels of 20 or 30 circuits each. They have 1 set of wipers for each level, and an auxiliary shaft to select 1 of the 10 sets of wipers.

Automatic Trunk and Toll Working. The usual present method of trunk and toll working on automatic networks is for an outgoing controlling operator to dial the required subscriber over the network, and record particulars of the call on a ticket which is then used for costing purposes. Increasing use is being made of automatic ticketing of calls to permit direct trunk subscriber-to-subscriber dialling. This facility requires equipment to identify the calling line and an automatic ticketing machine which may produce a printed ticket, or a punched tape, recording all particulars of the call, including the charge.

Other telephone administrations, particularly in Europe, have adopted a repeat metering process whereby the normal subscriber's meter is automatically operated a number of times for each call. The number of operations depends on the distance and duration of the call, and is automatically determined by equipment. One meter operation is regarded as the unit charge for a local call.

LINE PLANT. Telephone lines may be overhead or underground. Overhead lines are bare copper wire, supported by porcelain or glass insulators mounted on poles. In general, modern practice is to lay underground cables (q.v.) which are of the paper-insulated or co-axial type.

Line plant is expensive, and often a system of carrier working is adopted to increase the circuit-carrying capacity of a single line. Carrier working permits a better utilisation of the frequency band which a line is capable of transmitting. A line may transmit a frequency band which is many times that required for commercial speech, and it is possible to form a number of speech circuits on the one line by shifting the speech frequencies of each subscriber to another band (modulation, q.v.) and demodulating at the receiving end. Up to 24 channels per line may be obtained on ordinary underground cable circuits. The separation of the various carrier channels at each end of the line is performed by electric wavefilters.

Recent development in thermionic-valve (see VALVES) amplifier design has

made it possible to use wide-band transmission systems, where hundreds of carrier channels may be carried on one line. Wide-band systems require co-axial cables. The outer conductor is a copper tube, the inner conductor is a bare copper wire kept in the centre of the tube by insulating spacers. The 2 conductors so formed constitute the pair of a circuit, and 2 such tubes are required to form a 4-wire circuit. At the high frequencies used in wide-band systems the cable becomes a waveguide (q.v.). In submarine co-axial cables the insulation is solid, usually paraffin, on account of the great pressures.

STATISTICS. The U.S.A. is by far the greatest telephone user in the world, having over half the total world telephones.

See also POST OFFICE, *Telephones*; *SIGNALING, Military*.

See T. E. Herbert and W. S. Procter, *Telephony* (2 vols.), 1934-8; A. L. Albert, *Fundamentals of Telephony*, 1943; J. Poole, *The Telephone Handbook* (8th ed.), 1944; J. Atkinson, *Telephony* (vol. 1), 1948.

Teleprinters, see TELEGRAPHY.

Telescope. The first T. was probably made by the Dutchman Lippershey in 1608, although Galileo in 1609 constructed the first of his famous T.s and commenced astronomical observations at the beginning of the year 1610. Roger Bacon, who lived during the 13th cent., is often credited with the invention of the T.; while this statement is probably erroneous, it is remarkable to notice that the germ of the function of a T. is contained in his writings. The apparent size of an object depends solely on the angle it subtends at the eye; thus a sixpence may appear as large as or larger than the sun if it is held at such a distance that it subtends an angle at the eye as great as or greater than does the sun. The function of a T. is, then, to increase the angle subtended by an object at the eye, and as a result 2 things are judged to occur: (1) the object seems magnified; (2) the object seems to be brought nearer. The effect is, of course, a subjective one, for if we view a man 1 m. away through a T. and find that he appears to be 6 times as tall as when viewed by the naked eye, we estimate his distance as $\frac{1}{6}$ m.

Magnifying Power. The magnifying power of a T. is defined as the ratio of the angle subtended at the eye by the image viewed through the T. to the angle subtended at the naked eye by the object. Field-glasses commonly have a magnifying power of 8, while some of the finest astronomical T.s have magnifying powers of the order of 1000. The principle of the simple astronomical T. can be seen by referring to Fig. 1. It consists of a convex lens (C) of long focal length, called the objective, and a convex lens of short focal length, called the eyepiece. In order to show quite plainly how it works, a parallel beam is shown entering the objective in a direction inclined to the axis of the T.; such a beam would, for instance, fall on the T. from the edge of the

sun when the axis of the T. was pointing at the centre of the sun. The objective forms a real, inverted image at P, below F, its prin. focus, and the eyepiece is moved so that F is at a slightly smaller distance from it than the focal length of the eyepiece, the focus of which is f , in order to form a virtual image at X, 25 cm. away from the eye, i.e. at the least distance of distinct vision. With-

bination consisting of a convex lens of crown glass placed in contact with a weaker concave lens of flint glass that partially corrected the dispersion produced by the convex lens, the combination behaving as a weaker convex lens. Since that time, the study of achromatic combinations has made so much progress that the Yerkes T., the largest refracting T. in the world (40 in.), is constructed on

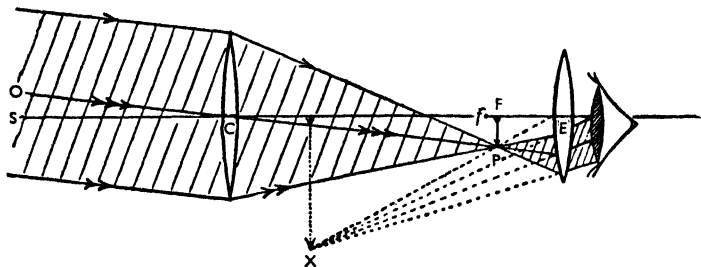


FIG. 1. PRINCIPLE OF SIMPLE ASTRONOMICAL TELESCOPE

out the instrument the angle subtended at the eye by the radius of the sun would be \widehat{SCO} , but with the instrument, the angle subtended by the radius of the

image of the sun is increased to \widehat{CEX} , hence the sun appears to be greatly enlarged. The objective and eyepiece are mounted in a tube whose walls are blackened on the inside to prevent confusion arising from light reflected by the walls of the tube. The instrument described above has 2 serious defects, viz. the image suffers from *spherical aberration*

the essential principles of the simple astronomical or refracting T. Various forms of eyepieces are used instead of the single convex lens in order to obtain greater magnification without the defects of aberration.

Galileo's T. is the prototype of modern opera-glasses. The astronomical T. produces an inverted image; this is immaterial for astronomical observations, but it renders the instrument useless for terrestrial work. The simple pattern of the Galilean T. is shown in Fig. 2. The objective (O) is a convex lens of comparatively long focal length, and the eye-

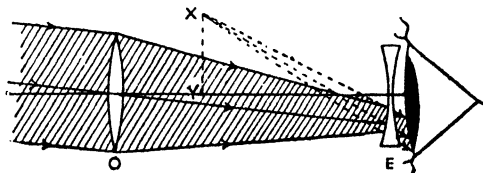


FIG. 2. PRINCIPLE OF GALILEAN TELESCOPE

(q.v.) and *chromatic aberration* (q.v.). Spherical aberration arises from the fact that a point object does not give rise to a point image when a single lens is used. The defect can be remedied by using stops and by using a compound lens. Chromatic aberration is due to the fact that the focal length of a simple lens is different for each of the coloured components of white light. The image produced is tinged with colours at its edges. The attempts to remedy this defect were completely unsuccessful until 1758, when Dollond discovered an achromatic com-

piece (E) is a concave lens of short focal length. The rays from the objective fall on E, and the final image formed by this concave lens is at XY, a virtual and erect image. The eye has, of course, been enlarged in the diagram for convenience. This instrument requires correction for spherical and chromatic aberration in a similar way to the simple astronomical T.

Reflecting Telescopes. Newton despaired of making a refracting T. free from chromatic aberration, and he designed the first reflecting T. on the lines shown in Fig. 3. M is a concave mirror of large

radius of curvature; its prin. focus is at F . Light from a distant star is reflected at M and the reflected beam converges towards I , a point vertically below F . A plane mirror m inclined at 45° to the axis of the instrument intercepts this beam and the real image is formed at f . This image is viewed by the eyepiece and the final image seen by the observer is a virtual one at I' .

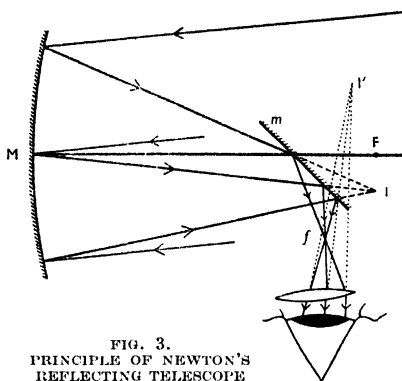


FIG. 3.
PRINCIPLE OF NEWTON'S
REFLECTING TELESCOPE

All subsequent reflecting T.s were modifications of Newton's, a famous one being that of Herschel, the great Brit. astronomer of the 18th cent. The 100-in. T. of the Mt Wilson Observatory, the second largest instrument to-day, is a reflecting T. The mirror, instead of being truly spherical, is 'parabolised' in order to avoid the aberration of a spherical mirror, and it is silvered on its front surface by a process of chemical deposition. In this way the silver can be renewed whenever desired. The mirrors of reflecting T.s are usually aluminised instead of silvered, and better results are obtained. A still larger T. with a mirror of diameter 200 in. is now in operation at Mt Palomar, California.

Brightness of Objects. In no case can objects such as the moon or sun appear brighter through a T. than they do when viewed by the naked eye, and if the losses of light by reflection or refraction are taken into account, the apparent brightness of such objects is actually diminished when viewed through a T. But this statement does not apply to the case of stars, whose apparent size is so small that diffraction effects are produced (see below). Under the best conditions the apparent brightness of stars viewed through a T. varies directly as the square of the diameter of the objective, and with the largest modern T.s stars appear about 100,000 times as bright when viewed through the instrument. As the brightness of the sky is not increased, it is possible to view stars in daylight.

Resolving Power. A star seen through a T. appears as a central bright disk of

light which is surrounded by alternate dark and bright diffraction rings. Two stars can be recognised as distinct stars, provided that the centre of the bright disk of one falls on the first dark ring of the other. If the stars are closer than this they cannot be distinguished as separate stars; if farther apart they are the more easily distinguished. The limit mentioned is known as the limit of resolution. It can be shown that the angle subtended at the centre of the objective by 2 stars that can just be resolved is $1.22\lambda/D$, where λ is the wavelength of the

light and D is the diameter of the objective. Hence the greater the D is, the greater the resolving power of the T.; in point of fact, the above fraction is adopted as the quantitative measurement of the resolving power of a T. The Yerkes T. can resolve 2 stars that subtend an angle of only $\frac{1}{2}$ sec. of arc at the centre of its objective. Michelson (q.v.) invented a form of interferometer (q.v.) attachment to the Mt Wilson T. that increased the resolving power of the instrument sev. times and made it possible to measure directly the angular diameters of some of the larger stars.

In astrophysical research a spectrometer attachment replaces the ordinary eyepiece, while permanent records are obtained by means of a spectrograph attachment, whereby the spectra are photographed. Cameras are fitted to T.s in all observatories, as it is possible to obtain prolonged exposures of any part of the heavens by means of a clockwork arrangement that keeps the instrument directed to a given area of the sky. Photographic records taken in this way reveal much more information than may be obtained by ordinary visual observation. See also RADIO ASTRONOMY.

See Helen Wright, *The Great Palomar Telescope*, 1953; H. C. King, *The History of the Telescope*, 1955; G. Matthewson, *Constructing an Astronomical Telescope*, 1955.

Teletich, see ACROSTIC.

Television is the transmission and visible reproduction of pictures or scenes by line or radiocommunication (q.v.).

History. The earliest practical demonstration of T. was given by J. L. Baird (q.v.) before the Royal Institution in 1926. In 1928 the Brit. Broadcasting Corporation experimented with the transmission of still pictures, using the 'fultograph,' and in the same year Baird transmitted a low-definition picture by radio to the U.S.A. In 1929 Baird commenced an experimental low-definition service from the Crystal Palace, and in Aug. 1932 the B.B.C. conducted tests in conjunction with the Baird Company, using a 30-line system radiated from the Brookman's Park station. The postmaster-general appointed a Television Advisory Committee in 1934 to determine which system should be followed for a public service. They recommended the abandoning of low-definition T., and accordingly, in Sept. 1935, the B.B.C. transmissions ceased. The first high-

definition T. service in the world began in Nov. 1936 with the opening of the B.B.C.'s station at Alexandra Palace, see TELEVISION, B.B.C.; INDEPENDENT TELEVISION AUTHORITY.

Scanning. The subject-matter to be 'televised' is scanned electrically, the

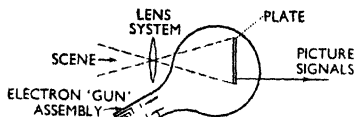


FIG. 1. SIMPLE CAMERA TUBE

resulting signals being transmitted for subsequent reconstitution at the receiver into an image. The scanning process takes place: (1) at the transmitter, where the image is broken down, and (2) at the receiver, where the cycle follows that at the transmitter and is synchronised with it by means of synchronising signals transmitted with the picture.

Scanning for Transmission. The scene to be transmitted is projected by a lens arrangement in the T. camera on a flat

intensity falling upon it, so that the surface carries an electrical 'picture' of the image focused upon it. An electron-gun assembly, similar to that of a cathode-ray tube

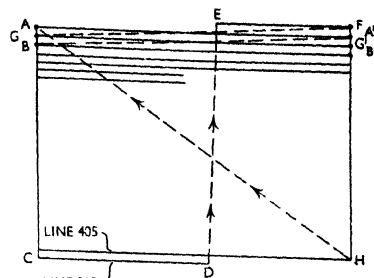


FIG. 2. 'RASTER' FORMATION, SHOWING INTERLACE

Typical fly-back lines are shown dotted.

(q.v.), projects a stream of electrons towards the mosaic. This stream is deflected by time-bases (q.v.), so that it scans the whole surface of the plate. As

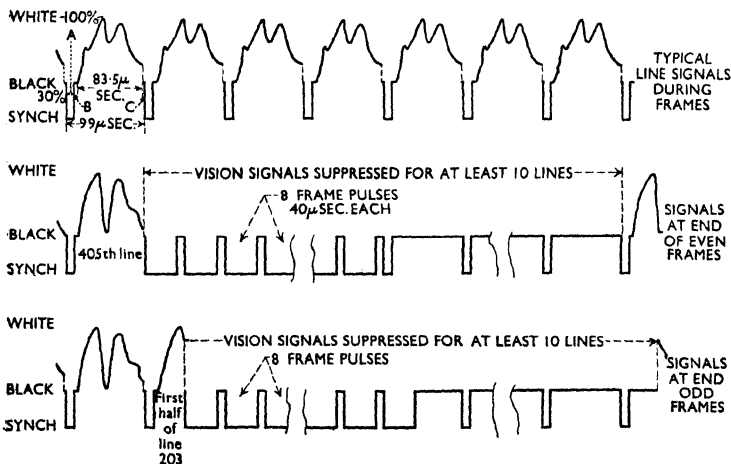


FIG. 3. B.B.C. TELEVISION TRANSMITTED WAVE FORM

A, 10 μ sec.; B, 5 μ sec.; C, 0.5 μ sec.

rectangular plate suspended within the tube (Fig. 1). The surface of this plate is a mosaic of photo-electric silver-caesium cells, each of which is microscopic in size and separated by an insulating film from a metal back plate. When the image is projected on this mosaic each cell takes up an electric charge proportional to the light

the beam passes over each cell it is discharged, transmitting to the back plate an impulse equivalent to the charge on the cell. In this way the output from the camera tube is an electrically varying current which represents, line by line and frame by frame, the make-up of light and shade in the picture.

Scanning at the Receiver. This is carried out by the moving electron beam in the cathode-ray tube, which is deflected in synchronism with that in the camera tube. Two time-bases are used, a horizontal ('line time-base') and one causing vertical deflection ('the frame time-base'). These operate in the same manner as those in an oscillograph (q.v.). The frequency of the line time-base for the Brit. T. system is 10,125 c/s, which means that 405 oscillations are completed each $\frac{1}{50}$ sec. While this is taking place the frame time-base applies its deflecting voltage at right angles to the horizontal lines drawn on the tube by the line time-base. The frequency of the frame time-base is 50 c/s, so that during one complete oscillation the line time-base completes only $202\frac{1}{2}$ lines. At the centre of the 203rd line the downward motion of the beam ceases and the frame time-base cycle starts again, so that a further $202\frac{1}{2}$ lines are completed, but interlaced with the first $202\frac{1}{2}$. This gives a completed picture of 405 lines in $\frac{1}{50}$ sec. (Fig. 2). The full frame is made up of two interlaced halves. This reduces the flicker of the repeating frames. The completed rectangle so reproduced on the face of the cathode-ray tube is called the *Raster*.

The B.B.C. Television Wave Form. Both line and frame synchronising signals are essential to ensure that the receiver time-bases are in step with those of the camera tube. The actual picture signal accompanying these must be capable of transmitting all the details of light and shade present in the camera, and in practice frequencies up to 3 Mc/s must be transmitted to give approximately equal definition in the horizontal and vertical directions. Positive modulation is used such that peak 'white' in the picture is represented by 100 per cent modulation of the carrier, 'black' by 30 per cent \pm 3 per cent, with the intermediate shades in between. Between zero and 30 per cent is used for transmitting the synchronising signals (often called synch pulses), which, being 'black' than black, do not appear on the *Raster*. Fig. 3 shows in graphical form, how these signals are disposed, relative to each other, in the final wave form.

The line pulses are of 10 μ s (microsec.) duration, separated from the picture wave form itself by a blank period of 5 μ s in front and 0.5 μ s behind. Frame pulses are 40 μ s long, so that the frame and half-frame synchronising signals are made up of 8 such pulses separated by 10 μ s intervals. To accommodate the frame and half-frame signals described, at least 10 lines of the *Raster* are suppressed at each half-frame, so that a 405-line picture possesses 385 active lines of picture material, i.e. lines 1-4 are occupied by 8 frame pulses, the following 6-10 lines being 'black', separated simply by the usual line pulses, and then the picture lines begin. At $202\frac{1}{2}$ lines the frame pulses are repeated, interlace is effected, and the remainder of the *Raster* is built up to give the completed picture. The ratio of height to width is 3:4.

Film Scanners. Increasing use of cinematograph film is being made in compiling T. programmes. Modern film scanners have been developed especially for T. transmission in which the film moves through the 'gate' at a constant speed, and scanning is accomplished by means of a 'flying spot' scanner. The latter, in its simplest form, produces a *Raster* on the screen of a special cathode-ray tube operated to give a very bright image. Nothing except the lines of the *Raster* appear on the tube screen, but these are focused on the film in the gate behind which a photo-cell picks up the light passing through the film as the flying spot on the scanning tube builds up the *Raster*.

Other Television Systems. Great Britain was the first country to inaugurate a public high-definition service; others with projected and existing T. stations include the U.S.A., where many are on daily schedules. The Amer. wave form differs from the Brit. in sev. respects: Negative modulation is used to transmit an interlaced picture of 525 lines and 30 frames. The accompanying sound is broadcast, using frequency modulation (see MODULATION). The Netherlands Philips Company operate an experimental system at Eindhoven similar to the Amer. but of 625 lines and 25 frames, while the French favour 819 lines and 25 frames. Sev.



B.B.C.

SYLVIA PETERS,
B.B.C. TELEVISION ANNOUNCER

Photograph taken from the screen of
a picture monitor at the B.B.C. studios.

attempts are being made to reach an agreed standard for Europe, so that programmes can be exchanged internationally. To do this it is essential that the number of lines and frames be the same even if the direction of modulation is

different, as the latter can be converted for relay purposes.

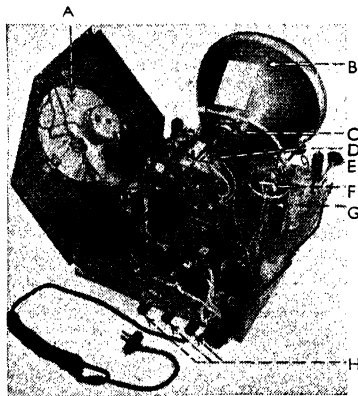
Receiving Aerials. Because the wavelength for any T. station is short a resonant aerial becomes possible, and this usually consists of a half-wave aerial made of light alloy or steel tube, and fed at the centre with low-impedance co-axial or balanced cable. Greater gain is obtained if a reflector element be added, and quite complicated arrays are used in areas of weak signal strength (see BEAM WIRELESS). These aerials are mounted either vertically or horizontally to conform with the polarisation of the transmitting aerials. Tubing is used for the elements, since an aerial made of wire would be too sharply resonant, with resulting loss of bandwidth, and therefore poor picture definition.

Receivers. Receivers (see RECEIVERS, RADIO) used for broadcast reception are tuned radio frequency (T.R.F.) or 'superhet' (superheterodyne); the latter is more common. T. receivers exist in both varieties, and the tendency is also to favour the superhet. Their main characteristics are that they should have sufficient sensitivity; the band-width accepted should be wide enough to reproduce all the picture detail; the time-bases should lock easily and not respond to impulsive interference; both vision and sound channels should also discriminate against such interference; and, finally, the picture should be sharply focused and bright, with correct grading of half-tones.

The T.R.F. receiver accepts the vision and sound signals at their carrier frequencies and amplifies them directly. Separate channels are used for sound and vision, following a common R.F. amplifier (see VALVES), and each has its separate detector. After detection the receiver operation becomes identical with that of the superhet. More stages of amplification are necessary than in a broadcast set.

In a superhet receiver the first valve is an R.F. amplifier accepting both sound and vision channels. Next follow one or two mixer valves, but only one oscillator is used. This oscillator beats with the sound and vision carriers to give 2 intermediate frequencies (I.F.), which are then fed to separate I.F. amplifier valves. The vision I.F. containing 1, or both sidebands, may have 2 or 3 such valves, while the sound is sufficiently amplified by 1 or 2. The vision (or 'video') signal is detected, amplified, and passed to the electrode of the cathode-ray tube which controls the intensity of the beam, and hence the light and shade of the picture. At the same time, the processes of 'synchronisation' and 'd.c. restoration' are performed. The synchronisation removes the synchronising signals from the video signal existing after detection discriminating between line and frame signals, and passing them to their respective time-bases. The d.c. restorer sets the 'black level' of the tube at zero potential, and by fixing it ensures that the video signals above 'black' in the picture are positive. In addition to the normal voltages common to other valves in the

receiver, a source of 'extra high tension' is necessary, which may be between 5 and 10 kV in a domestic receiver. Most present-day receivers employ 'line fly-back' making use of the fact that, on the horizontal return stroke of the beam, a very rapid change of current takes place in the winding of the line transformer which, possessing appreciable inductance, opposes this change so that a h.v. pulse appears across it. This pulse can be rectified, voltage doubled or trebled, smoothed and used for the final anode of the cathode-ray tube. Another system employs a separate R.F. oscillator having a sinusoidal wave form, which after amplification is passed through a peak rectifier, and thus the necessary E.H.T. is obtained.



Philips Electrical Ltd.

CHASSIS OF MODERN TELEVISION RECEIVER, SHOWING CATHODE-RAY TUBE, VALVES, AND MAIN COMPONENTS

A, loudspeaker; B, cathode-ray tube; C, deflection-coil assembly; D, focus coil; E, one of four main control knobs; F, E.H.T. rectifier; G, line-output transformer; H, time-base pre-set controls.

Big Screen Receivers and Projection Television. Before 1939 2 Brit. manufacturers demonstrated big-screen pictures successfully. The more remarkable was that produced by the Scophony Company, using high-precision mechanical scanning to give a bright picture which was projected on a cinema screen. The mechanical scanner, however, was very expensive and required skilled operation.

Projection T. is the system whereby pictures are thrown by optical means from the face of a small cathode-ray tube on to a much larger screen. Early attempts used projection lenses, but they lacked sufficient brilliance. A more recent development makes use of a Schmidt mirror lens arrangement. The light-path is 'folded' (Fig. 4) so that the whole

assembly becomes compact enough for inclusion in a domestic receiver cabinet. The picture is produced at AB on the tube face C, which is $2\frac{1}{2}$ in. in diameter; it is reflected by spherical mirror D to the plane mirror E through which the tube projects. Interposed between E and the second plane mirror G is a weak lens or 'corrector plate' which counteracts the spherical aberration introduced by D. The picture JK is reproduced by back projection on the screen H; 25 kV at 100 μ A are used for the final anode of the tube, whose screen is aluminium backed to give an intense black-and-white picture. Fig. 3 shows the optical unit from which the tube neck projects surrounded by (but not shown in the diagram) the focus and deflection coils. The picture possesses good brilliance, excellent tone gradation, and is almost independent of ambient light in front of the screen.

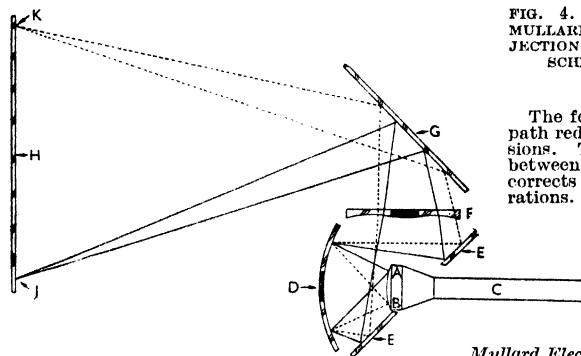


FIG. 4. DIAGRAM OF THE MULLARD TELEVISION PROJECTION SYSTEM, USING THE SCHMIDT PRINCIPLE

The folding of the optical path reduces cabinet dimensions. The correction lens between the two 45° mirrors corrects the spherical aberrations.

Mullard Electronic Products Ltd.

Colour Television. J. L. Baird was an early pioneer in this direction, and one of the first techniques developed employed a system whereby the normal frame frequency was increased by a factor of 3, each successive frame containing the material for one primary colour. The receiver used revolving colour disks in front of the viewing screen, synchronised with the correct frame colours at the camera. A similar system replaced the colour disks by 3 superimposed projected pictures corresponding to the 3 primary colours. In 1949 the Radio Corporation of America produced a 6 Mc/s compatible high-definition colour 'I' system which, it is claimed, requires no wider frequency band than for a monochrome picture, and enables standard monochrome receivers to accept the same signal without modification.

Its main use is on closed-wire circuits, e.g. in a teaching hospital where a camera over the operating table can transmit images in full colour to a number of receivers located at a remote point where students can follow in close-up detail the operation being performed.

See M. G. Scroggie, *Television*, 1935; A. W. Kecn, *The Principles of Television*

Reception, 1949; M. Gorham, *Television*, 1949; British Broadcasting Corporation, *The B.B.C. Television Service: a Technical Description*, 1950; J. Swift, *Adventure in Vision*, 1950; Jan Russell, *The Art of Television*, 1952; F. J. Camm, *Television Principles and Practice*, 1955; A. Swinson, *Writing for Television*, 1955; H. Bettinger, *Television Techniques*, 1957. See also BROADCASTING.

Television, B.B.C. The B.B.C. began the first public service of high-definition television in the world from the Alexandra Palace, London, on 2 Nov. 1936. By the outbreak of the Second World War, when this television broadcasting service had to cease for reasons of national emergency, there were approximately 20,000 receiving sets in Britain. The B.B.C. television service reopened in June 1946.

The second charter granted to the B.B.C. in 1937 entrusted the B.B.C. with

television broadcasting, in accordance with the recommendations of Lord Selsdon's Television Committee of 1934 which was endorsed by the Report of Lord Ullswater's Committee of 1935. The licence, which the B.B.C. is required under its charter to acquire from the postmaster-general, does not permit the B.B.C. to derive any revenue from advertising in programmes. Commercial advertisements and sponsored programmes are debarred.

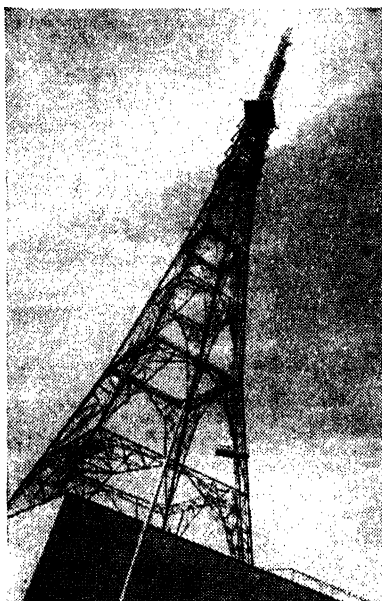
In December 1957 eighteen transmitting stations capable of reaching some 98 per cent of the pop. were in operation—a higher proportion of national coverage than has been achieved in any other country—and over 7,000,000 receiving sets were in use.

The transmitters in operation at the end of 1957 were:

Transmitter	Area Served
Crystal Palace	London and the Home Cos.
Sutton Coldfield	Midland Cos.
Holme Moss	N. of England
Kirk o'Shotts	Central Scotland
Wenvoe	S. Wales and part of W. of England

Television

<i>Transmitter</i>	<i>Area Served</i>
Divis	Major part of N. Ireland
Meldrum	NE. Scotland
Pontop Pike	NE. England
North Hessary	Devon and Cornwall
Tor	
Rowridge	S. England (Dorset, Hampshire, W. Sussex)
Norwich	E. Anglia
Londonderry	NW. parts of N. Ireland
Rosemarkie	Moray Firth
Blaen-plwyf	West Wales
Sandale	Westmorland, Cumberland, and SW. Scotland
Douglas (I.O.M.)	Isle of Man
Les Platons	Channel Is.
Truleigh Hill (temporary)	Brighton, Hove



B.B.C.

B.B.C. CRYSTAL PALACE TELEVISION TRANSMITTING STATION

Transmitting mast under construction.

By 1957 regional studio facilities were available in Manchester, Birmingham, Bristol, Glasgow, and Cardiff. Mobile television units were serving in Scotland, Wales and the Midlands, N. and W. regions of England. Film-making resources were available in N. Ireland.

The B.B.C. applied to the gov. in July 1955 for the allocation of frequencies in

Television

Band III in order to provide a second television service, which it deems essential to the fulfilment of the requirements of the charter, that is, to provide a complete service to 'disseminate information, education and entertainment.' The postmaster-general announced in Feb. 1956 that the gov. had decided to defer consideration of any additional television programme for 2 years.

On its single programme, the B.B.C. transmits some 55 hrs a week. The maximum permitted by the postmaster-general, the authority prescribing hours of broadcasting in Britain, is 50 basic hours with extensions for specific purposes. This service aims at providing as far as possible the balance prescribed in the charter, and caters both for the majority and for minorities. Of the total of 15,335 staff employed by the B.B.C., some 4137 were engaged exclusively on work for the Television Service (figures at Mar. 1958).

In its television services the B.B.C. broadcasts in a year more than 4000 items. In 1956-7 B.B.C. television broadcasting was approximately 2794 hrs. The cost per hour was calculated at some £3,256. Programmes and engineering absorbed 47 and 38 per cent respectively of the total expenditure for the year 1956-7—£9,096,000. Television news, which was first presented as a 20-min. illustrated news bulletin in 1954, now appears in sev. nightly eds. Drama, music, and light entertainment programmes account for approximately 33 per cent of the output, while sport and outside broadcasts covering important occasions and interesting events make up another quarter of the programme output. Programmes for women and children, religious programmes, and many discussion programmes on current affairs are also provided. At the request of the School Broadcasting Council, the B.B.C. began a service of programmes for schools on television in the autumn of 1957. (School broadcasts in sound are now received by some 29,000 schools.)

The B.B.C., with the co-operation of broadcasting organisations on the Continent, has successfully developed television programme exchanges with some 9 countries, with the participation of up to 14 networks. In Sept. 1955 the first part of a permanent 2-way television link between England and France was completed. This section consists of co-axial cables joining London with the coast at St Margaret's Bay, in Kent. The next section, which is expected to be ready before 1959, will be a permanent 2-way radio link across the Channel. A temporary 2-way radio link across the Channel, installed and operated by the B.B.C. and Radiodiffusion-Télévision Française, is in operation. The Eurovision exchanges developed after the highly successful Coronation television broadcasts of 1953, when B.B.C. television programmes were relayed by 12 television transmitters in France, the Netherlands, W. Germany, and Berlin. It was estimated that the audiences for the

Coronation television broadcasts amounted to some 20,000,000 in the U.K. alone.

Colour Television. The B.B.C. has done considerable research into colour television. Experimental test transmissions from Alexandra Palace were begun in Oct. 1955. Two further series of test transmissions were carried out in 1956 and 1957. A fourth series began in Oct. 1957. The B.B.C. is not committed to a compatible system, that is, one in which the colour signals may be received as a black-and-white picture on monochrome

son of an Eskdale shepherd, and apprenticed to a local stone-mason when 14 years old. He went to Edinburgh in 1780, and to London and Portsmouth in 1784. T. built the Severn bridges at Montford and Buildwas, 1793-6; the Ellesmere Canal, 1796-1801; the Caledonian Canal, 1801-23, and in the same period over 1000 m. of road and 1200 bridges throughout Scotland. His greatest achievement was the improvement of the London-Holyhead road with the building of the Menai suspension bridge.



B.B.C.

B.B.C. RIVERSIDE TELEVISION STUDIOS

The 'special effects' control desk in the vision control room of a studio.

receivers, nor is it committed to the non-compatible, that is, those which can be received only on a colour receiver. The first B.B.C. tests were made on a Brit. version of the National Television System Committee system, which is compatible. The decision as to the system to be used will be a matter for the postmaster-general, advised by the Television Advisory Committee. In April 1956 the B.B.C. demonstrated its work on colour television to a study group formed by the C.C.I.R. (the International Consultative Committee on Radio Communications) and in Jan. 1957 two demonstrations were given at the Palace of Westminster for the benefit of Members of both Houses of Parliament. See also BROADCASTING; INDEPENDENT TELEVISION AUTHORITY.

Telford, Thomas (1757-1834), civil engineer, b. Wester Kirk, Dumfriesshire,

He also did much harbour work in Scotland; he built St Katherine Dock, London; the Gotha Canal, Sweden; and designed the Warsaw frontier road for Tsar Alexander. A man of talent, wholly self-educated, T. often gave his services gratuitously. He was one of the founders of The Institution of Civil Engineers (1818), and was its first president. He is buried in Westminster Abbey. His autobiography was pub. in 1838. See L. T. C. Roit, *Thomas Telford*, 1955.

Tell, William, national hero of Switzerland. The story in the form which first appears in a chronicle written between 1467 and 1476 would appear to be largely legendary, but sev. Swiss critics suggest that T. did really live, and that he may have played some part in the rising of the Inner Cantons against the tyranny of

the Hapsburgs at the beginning of the 14th cent., though his importance has been greatly exaggerated in the legends that remain, and his real character has been obscured by a confusion with old folk-themes. The prin. source of the life and deeds of T. is the *Chronicon Helveticum* of Aegidius Tschudi (1505-72), which is even more embellished. From this Schiller took his drama *Wilhelm Tell*, 1804. The story centres on the struggle for independence of the cantons of Uri, Schwyz, and Unterwalden, and is as follows: T. having refused to do homage to the ducal hat which Gessler, the Austrian governor, set up for the purpose in the market-place of Altdorf, was taken prisoner, and on being brought before the landgrave was promised his liberty if he could shoot an apple in two, placed on his son's head, at the distance of 80 paces. He accomplished the task, but confessed on compulsion that the other arrow in his hand was meant for Gessler's heart had he killed his son, whereupon he was again seized and taken on the lake bound for Küssnacht Castle. But a storm having arisen, T. was asked to steer the ship, and while doing so effected his escape. He sprang ashore, pushing the boat back from the shore by his spring, an incident which has given its name to a place, the Telleprung. He afterwards killed the landgrave, and his actions became symbolic of the courage of the Inner Cantons in their struggle against the Hapsburgs. See F. Schiller, *Wilhelm Tell* (trans. by A. Latham, Temple Classics). See also P. Lang, *Die Schweizer Tellspele*, 1924; F. Gropengießer, *Wilhelm Tell in der Schweiz, Geschichtsschreibung*, 1940; K. Meyer, *Der Ursprung der Eidgenossenschaft*, 1941; R. Labhart, *Wilhelm Tell als Patriot und Revolutionär*, 1947.

Tell, see ALGERIA; TUNIS.

Tell Basta, see BUBASTIS.

Tell el Amarna, modern name of an ancient site on E. bank of Nile about 180 m. S. of Cairo. The ruins are those of Akhetaton, the capital of Akhnaton (q.v.), who built it c. 1360 BC to replace Thebes when he abandoned the worship of Amen for Aton. After his death the city was destroyed and has since been uninhabited. In 1887 peasants found there a group of clay tablets consisting of letters mostly in cuneiform from Asiatic potentates and Egyptian vassals in Palestine and Syria to Akhnaton and his predecessors, which are of great historical importance. Most are now in Berlin and the British Museum. Excavations by Petrie (1892) disclosed inlaid coloured pavements and important evidence for the early manufacture of glass, etc. In the hills E. of the city were cut tombs for Akhnaton's courtiers, containing scenes typical of the art of the period, and beautiful hymns to the Aton.

Tell-el-Kebir, see TEL-EL-KEBIR.

Tell el-Mugayyar, see UR.

Tellers of the Exchequer, see TALLY.

Tellez, Balthazar, see GALLAS.

Télez, Gabriel, see TIRSO DE MOLINA.

Tellurium (symbol Te, atomic weight 127.6, atomic number, 52), rare element of the sulphur group. It occurs in the free

state in nature, but is chiefly obtained in combination with other elements, as in tellurite (TeO₂) and tetradytmite (Bi₂Te₃). It is a bluish-white solid with a metallic lustre (melting-point 452°C.; sp. gr. 6.26). T. forms tellurides with hydrogen and the metals, corresponding to the sulphides. Two oxides, the dioxide and trioxide, are known, which give rise respectively to the 2 acids, tellurous acid and telluric acid.

Tellus, see GAEA.

Telpher, see under MONORAIL.

Telugu, Dravidian language spoken in the central and E. portions of S. India. It may be said that Telingana ('Teluguland') stretches roughly N. from Madras to the borders of Orissa and NW. to Bellary, where T. meets the Kanarese. Of all the Dravidian languages, T. is spoken by the largest number of people, about 22,000,000. It is strongly admixed with Sanskrit.

Tembuland, div. of Cape Prov., S. Africa, one of the Transkeian Terts. (q.v.), situated near the coast to the SW. of Griqualand E. Area 3339 sq. m. Umata is the cap. The name is derived from a Kaffir tribe, who claim to be descendants of Tembu.

Teme, riv. of Great Britain. It rises in Wales, and flows through Shropshire and Worcestershire, to join the Severn near Worcester. It is 60 m. in length.

Temenos (Gk. from *temnain*, to cut), in Gk architecture, a sacred enclosure adjoining or surrounding a temple.

Temesvar, see TIMISOARA.

Temir Tau, tn and iron and steel milling centre in Karaganda oblast (prov.) of Kazakh S.S.R. of the Soviet Union. Pop. 60,000.

Temora, tn in New S. Wales, Australia, 301 m. SW of Sydney. Once a prosperous goldfield, T. is now the centre of wheat-growing and sheep-raising dists. Pop. 4620.

Tempe, valley of N. Thessaly, famous for its beautiful scenery, to which there are many references in ancient literature. It was the traditional scene of Apollo's purification after the slaying of Python, and of Daphne's metamorphosis.

Tempera, or **Fresco Secco**, see under FRESCO PAINTING; MURAL DECORATION.

Temperament, in music, is connected with the intonation of the notes in a scale, on the one hand, and the tuning of instruments, on the other. In vocal and to a great extent in instrumental music the intervals of a scale are flexible, even if we disregard the ever-present danger of singing and playing out of tune. A singer or string player with a keen ear, especially if unaccompanied by a tempered instrument, such as the piano, will instinctively or consciously make a slight difference between A flat and G sharp, which on the piano or the organ are played by one and the same mechanism. The tuning of keyboard instruments had thus always to be slightly adjusted, and until equal T. came into universal use for their tuning, some notes, and therefore some keys, were more noticeably out of tune than others. Thus B flat on a harpsichord was purer than A sharp, and F sharp purer

than G flat, with the result that the extreme sharp and flat keys were considerably out of tune and therefore rarely used. Equal T., on the other hand, adjusted all the intervals so that there was exactly the same difference in the ratio of vibrations between all of them, with the result that the black-key notes remained the same whether sharp or flat, at the cost of very slightly distorting many of the intervals within the scale. Bach, by writing 48 preludes and fugues in all the major and minor keys in his *Well-tempered Clavier*, proved that the distortion is too small to disturb even a musician with so fine an ear as his and that keyboard instruments could henceforth be regarded as capable of dealing satisfactorily enough with any key.

Temperance. The recognition of the social, moral, and physical evils which may be directly or indirectly traced to the excessive consumption of alcohol is of comparatively recent origin. The attitude of civilised mankind on the subject has undergone change within the last cent. The more critical attitude adopted has been accompanied by widespread constructive endeavour towards the abatement of intemperance. It can now be generally assumed that moderate drinking has steadily increased, while no evidence exists to prove any general increase in the numbers of those who totally abstain. Heavy drinking is to be found in many sections of the community. Alcohol is no longer the escape mainly from poverty, unemployment, and illness. Excessive use of alcohol is now due to many other causes, e.g. mal-adjustment to normal life. Many who suffer from mental abnormality seek relief in alcohol, and people of a nervous disposition may indulge because of the feeling of well-being that alcohol imparts. Above all, a great number of alcoholics have reached that state by imperceptible advances from controlled social drinking.

In Great Britain in 1948, the expenditure on beer was £577m., in 1956 it was £547m. The expenditure on wine, spirits, cider, etc., in 1948 was £249m, but in 1956 it was £348m. Wines have greatly increased in popularity, as have also the non-alcoholic fruit juices. During the 19th cent. various computations gave intemperance as the chief cause of the major social evils, some authorities placing the proportion as high as 75 per cent. Careful examination made since 1948 has revealed that in cases of secondary poverty drink is the main agent, direct and indirect, of destitution. Some are poor because they drink, but others drink because they are poor.

The prin. existing means adopted since the origination of the T. movement in 1826 may be conveniently classified into: (1) prohibition and local option; (2) the Scandinavian company system, which places the control of the sale of liquor in the municipality, the profits to be utilised for public purposes; (3) state monopoly of municipal control; (4) the institution of counter attractions; (5) high licence; (6) taxation of liquor.

Prohibition (q.v.) was tried in the U.S.A. and other countries, and involved the suppression of the buying and selling of liquor within the ters. concerned. Eng. T. organisations never favour prohibition except as a long-term policy and as the result of the enlightened judgment of the community, but are for the most part strongly in favour of local option (q.v.). Under the Scandinavian company system, called the Gothenburg system, the liquor traffic was controlled by companies to whom the municipal authorities transferred all liquor licences (see LOCAL OPTION). In Sweden in 1919 the Bratt system replaced the Gothenburg system, by a charter of the Stockholm City Council and control rested in the hands of a central trade organisation subject to a royal board of control. In Oct. 1955 Sweden abolished the rationing system for the sale of strong drink. Many measures have now been adopted to combat alcoholism there. A special propaganda campaign has been started. Advertisements for liquor will be forbidden. Greater care is to be taken of alcoholics. More research work is to be undertaken. Bigger subsidies will be given to T. societies, and generally better facilities for T. education will be provided. Finland, like the U.S.A., had an absolute prohibition law adopted in 1919. An advisory national plebiscite was held in Jan. 1932, a great majority voting in favour of abolition of prohibition. The Parliament thereupon set about passing a law permitting the sale of all liquors, but under a state-controlled monopoly. The system of state monopoly was adopted in tsarist Russia. In 1924 the Soviet Gov. revoked the Imperial Edict which forbade the sale of intoxicants and controlled the sale of such by State monopoly. In 1949 the gov. reduced the price of vodka by more than 50 per cent. In 1954 the Moscow Minister of Health considered steps to educate public opinion in this matter, and so encouraged social ostracism towards alcoholics.

The increasing concern for the welfare of childhood and youth is reflected in legislation in many countries. In England this concern has been accentuated by the grave increase in juvenile delinquency, with which is associated the mounting figures for the convictions for drunkenness of people under 20 years of age. The increase in drunkenness in males between the ages of 17 and 20 between 1946 and 1949 was 25 per cent, but in the years 1949-54 it was 167 per cent. In 1956 the Occasional Licences and Young Person's Bill became law, making provision that in places which had obtained an occasional licence the same restrictions concerning sale and consumption of liquor to young people that apply in public-houses should also apply in these places. A similar Bill, entitled *The Children and Young Person's (Registered Clubs) Bill*, has been framed. This Bill would provide that no person under 14 would be allowed to be in the bar of a registered club during permitted hours, and no person under 18 would be allowed to serve or be served with intoxicants in

any bar on the premises of a registered club. The alarming increase in road accidents has awakened deep thought in many countries. During 1955 1 person in every 700 in Britain was killed or seriously injured in road accidents. The extent to which these are due to strong drink is difficult to determine in this country at the moment. But where blood and other tests are applied to those responsible for accidents, revealing data have been provided. One authority in America states that 35 per cent of all Amer. highway accidents were caused by drivers under the influence of alcohol; a Swedish authority states that a comparable figure for Sweden is 37 per cent. The Brit. Gov. awaits a report by the Research Council on the relationship between road casualties and strong drink, with the intention of taking appropriate legislative action. Alcoholism is receiving great attention in many countries. The World Health Organisation (q.v.) has a special committee dealing with this subject. In France in 1955, 4106 people died from acute alcoholism, and another 12,076 from cirrhosis of the liver. The W.H.O. stated that in England there were 350,000 suffering from alcoholism and 86,000 from chronic alcoholism; the number increases. Much excellent research work on this has been done by medical experts and psychologists. Commendable service has been rendered by the members of Alcoholics Anonymous in helping to rehabilitate the erstwhile alcoholic. Both the gov. and Church are showing a deepening interest and concern in this tragic aspect of the drink problem.

For a time the most promising solution of the drink problem was considered to be in the direction of the municipal control of the drink traffic, but experiments along these lines have not been wholly successful, particularly when they have been divorced from any democratic control by local option. Opponents of public ownership contend that the mere transfer of the vested interest from private to public ownership does not necessarily improve sobriety. They maintain that it simply confers a civic dignity upon the trade in intoxicants. Prominent supporters of T. include Father Mathew, Cardinal Manning, Archbishops Frederick and Wm Temple, Lord Snowden, and Lady Astor (q.v.). There is a permanent T. Council of the Christian Churches at Parliament Mansions, Westminster. See also PROHIBITION. See H. LEVY, *Drink, an economic and social study*, 1951; U.N. World Health Organisation, *Alcohol and Alcoholism*, 1955; C. Rea, *Alcoholism, its psychology and cure*, 1956.

Temperature: 1. In physics, the degree of hotness of a body, the condition determining the power of a body to transfer or receive heat from another body. A body *A* is said to be at a higher T. than a body *B* if heat flows from *A* to *B* when the two bodies are placed in contact. Any property of a body which depends on T., e.g. its length, or electrical resistance, can be used to define a Scale of T. It is

necessary first to assign temps. to 2 'fixed points,' e.g. the melting point of ice and the boiling point of water under specified conditions. The particular property considered, e.g. length of a column of mercury in a glass capillary, is measured at these 2 fixed points and a relation is assumed to exist between the change in the property (length) and the change of T. In the simplest case the relation assumed is a linear one, i.e. change of length is proportional to change of T. The Centigrade (q.v.) Scale takes the Ice Point to be 0° C., and the Steam Point to be 100° C. If L_0 is the length of the mercury column at 0° C., and L_{100} that at 100° C., the temp. T° C. corresponding to a length L_T is given by

$$T = (L_T - L_0)100 / (L_{100} - L_0)^\circ \text{C.}$$

The Fahrenheit (q.v.) Scale defines 32° F. and 212° F. as the Ice and Steam Points. Scales of T. defined in terms of the properties of various thermometric substances are not exactly the same. Kelvin (q.v.) defined an Absolute Scale of T. (see THERMODYNAMICS) and showed that it was the same as the Perfect Gas Scale. This can be closely approximated to in practice, and other scales can be corrected by comparison for more precise measurements. See THERMOMETER AND THERMOMETRY; GAS AND GASES; PYROMETER; METROLOGY.

2. **Body Temperature.** The T. of the body varies with the different forms of life. In man it lies between 98.4° and 99.5° F. in a state of health, and between these limits there are slight variations due to the amount of exercise, ingestion of food, the T. of the surrounding atmosphere, etc. In the cold-blooded animals the T.s have a wider range and are much lower than in the human family. Thus the T. of the frog may vary from 63° to 48° F., according to circumstances, and that of the python, about 76° F., may be higher when the female is coiled around her eggs. It is not always easy to draw a hard-and-fast line between the cold-blooded and warm-blooded animals; hibernating animals like the dormouse, hedgehog, and others resemble cold-blooded animals during their winter sleep. Some of the mammals which are born in a state of immaturity (naked and blind like rabbits and rats) bear a resemblance to cold-blooded animals. There are small fluctuations in T. in human beings during the day; it reaches its maximum during the afternoon and evening, from about 4 p.m. to 9 p.m., and a minimum in the morning hours, from about 1 a.m. to 7 a.m. The source of animal heat is due to the oxidation within the tissues of the body, and different foods have different values as heat producers. The almost uniform T. of the body is maintained by a process of adjustment, superfluous heat being eliminated by different means, the lungs and skin playing a major part in this process. There is a heat-regulating centre in the brain.

3. **Air Temperature** varies appreciably with time, but, in any one place, the mean T. over an interval of, say, 10 min.

changes only slowly and can be measured approximately by a thermometer which has a short time-lag, shielded from radiation in a Stevenson screen or whirled through the air (see further METEOROLOGY). A detailed record of this 'mean' T. throughout the day can be obtained by using a thermograph (q.v.), but a rough idea may also be obtained by using maximum and minimum thermometers in addition to reading an ordinary thermometer at fixed times. T.s in the upper air are measured by instruments attached to aircraft, or supported by kites or kite balloons or, more frequently nowadays, by radio-sonde (q.v.). Since the air near the surface is warmed or cooled by contact with the earth's surface, the daily maximum usually occurs in the early afternoon when the heat loss from the surface by radiation, conduction, and convection just balances the heat received from the sun and the sky. The daily minimum T. usually occurs about dawn when the sun's radiation begins to warm the earth's surface again.

The figures generally accepted for extremes of temp. near the surface are as follows: world highest, Azizia (Libya), 58° C. (136° F.), Sept. 1922; world lowest, -67.8° C. (-90° F.), Verkhoysk, Siberia, Feb. 1892. British Is., highest 38° C. (100.5° F.), Tonbridge, July 1868; lowest -28.8° C. (-20° F.), Grantown-on-Spey, Scotland, 1955. The actual surface temp. is often considerably higher than the air temp. at 4 ft.

Tempering, heat-treatment process for relieving certain stresses that may occur in hardened steels, and for recovering to specific limits the hardness and ductility essential to hardened steels. A hardened steel that has not been tempered or stress relieved can be brittle and susceptible to cracking. The process consists of reheating the hardened steel to a specific temp. and quenching in oil and water or by cooling in air. The oldest method of determining T. temp. is one of observing the surface oxide colour tints that occur whilst the steel is being reheated. These tints indicate with some measure of accuracy the temps. reached. When the appropriate colour change appears the steel is cooled in air, oil, or water. This method is not capable of close control of temp., and is not now often used.

The methods used for heating steels to T. temps. are: (1) By the use of hot cast-iron plates, upon which the parts to be tempered are placed. As soon as the required T. colour appears the parts are removed from the heat. (2) The parts to be tempered are placed in a box or tray of clean dry sand and heated upon a fire hearth or forge. (3) Baths containing oil, lead, or salt are heated and maintained at exact temps. The parts to be tempered are placed in a suitable basket or cradle and suspended in, or passed through the hot liquid. (4) Lastly, there are various types of electrically heated and air-controlled furnaces in which the parts to be tempered are heated. The trend in modern methods of T. is to use liquid baths for reheating, and towards the use

of pyrometer and thermo-electric control for accurate measuring of T. temps.

Temperley, Harold William Vasselle (1879-1939), historian, b. Cambridge, and educ. at Sherborne School and at King's College and Peterhouse, Cambridge. He became a fellow of Peterhouse in 1904. T. frequently visited the Balkans between 1905 and 1909, notably during the Young Turk revolution. In the First World War he served in the Dardanelles campaign. In 1920-4 he ed. the *History of the Peace Conference of Paris*. T. was recognised as one of the leading modern historians by his work on the *Foreign Policy of Canning*, 1925. He collaborated in the production of the *Cambridge Modern History*. With G. P. Gooch (q.v.) he was given the task of editing the Brit. documents relating to the origin of the First World War, which were produced in 11 vols. (1926-38) as *British Documents on the Origins of the War*. From 1930 he was prof. of modern hist. in the univ. of Cambridge. In 1938 he succeeded Lord Birdwood as master of Peterhouse. T. was considered an authority on Brit. foreign policy after 1815.

Tempest, Dame Marie (1866-1942), actress, b. London, her real name being Mary Susan Etherington. She was educ. at the Convent des Ursulines, Thildonck, Belgium, and studied music in Paris and at the Royal Academy of Music under Manuel Garcia. In 1885 she acted in Suppé's *Boccaccio*. From 1895 to 1900 she was the leading attraction at Daly's and drew great audiences to such musical comedies as *The Geisha*, *San Toy*, *A Greek Slave*, and *An Artist's Model*. She then abandoned the musical stage. Her change to 'straight' acting proved immediately triumphant. She began with historical and romantic comedy, appearing as Nell Gwynne and Peg Woffington, following these with Becky Sharp and Polly Eccles. Her technique was artificial, yet an ideal medium for the expression of caprice and waywardness in light comedies. Her chief parts in this type were in *The Marriage of Kitty* and in Arnold Bennett's *The Honey-moon*. She had a series of successes in Somerset Maugham's epigrammatic comedies. As an actress of the mannered style she had no equal during all her later years, and her vivacity was perhaps her outstanding natural gift. D.B.E. 1937.

Tempio Pausania, tn in Sardinia (q.v.), 32 m. N.E. of Sassari (q.v.). It is the centre of the cork industry. Pop. 15,800.

Templars, or Knights Templars, military order founded in 1118 by 9 Fr. knights, led by Hugh de Payns. They received their rule in 1128 from St Bernard. Their original vow was simply to maintain free passage for the pilgrims who should visit the Holy Land. The name that they first took was the Poor Soldiers (*Pauperes Commilitones*) of the Holy City, and they professed to have no source of subsistence but the alms of the faithful. Pope Honorius II confirmed their rule and assigned a white mantle as their badge. Pope Eugenius III added a red cross on the left breast to the mantle. The anct banner of the T., *Beauseant* (O.F., a black and white horse), was partly per pale

argent and sable, and *Beauseant* was the famous war-cry of the order. Their motto was *Non nobis, Domine, non nobis, sed Nomini Tuo da gloriam*; and their seal showed 3 knights riding 1 horse. The constitution of the Knights Templars was simple. At the head was the grand master, who was elected by the general body of the knights. Under him was his seneschal or lieutenant; other high officers were the marshal, the treasurer, etc. The sev. countries in Asia and Europe in which the order had possessions were denominated provs., and each of them was presided over by a resident chief, called a grand prior, grand preceptor, or prov. master. Under the prov. masters were the priors, otherwise called bailiffs or masters, who each had charge of 1 of the dists. into which the prov. was divided; and finally, under the priors were the preceptors, each of whom presided over a single house or estab., hence called a preceptory. For more than 170 years the Soldiers of the Temple formed the most renowned portion of the Christian troops, and almost every encounter with the enemy bore witness to their prowess and daring. By 1300 the order had 15,000 members, and its property included 9000 castles and manors. The destroyer of the T. was Philippe le Bel of France. He compelled the Pope to summon the grand master, Jacques de Molay (q.v.), to Europe. In 1307, whilst Molay was at Paris, 2 individuals of notoriously evil character made certain revelations accusing the T. of heresy, idolatry, unbelief, and a number of foul practices. As a result, the order was suppressed at the council of Vienne in 1312, many of its members executed, and its property confiscated. It continued, however, in Portugal, where it took the new name of the Order of Christ. The name survives in the Temple, London, and the Temple, Paris, etc., and a number of their churches, built in the round style peculiar to the order, still exist. The London Temple Church survived the Second World War with severe damage.

See M. Lobet, *Histoire mystérieuse et tragique des Templiers*, 1943.

Temple, Frederick (1821–1902), prelate, educ. at Blundell's School, Tiverton, and Balliol College, Oxford, where he met and formed a friendship with Jowett, Matthew Arnold, and Clough. T. was ordained deacon in 1846 and priest in 1847. In 1857 he became headmaster of Rugby, where he continued the work of Arnold, though he laid more stress than the latter on the place of orthodox religion in school life. His friendship with Gladstone, whose Liberal views he shared, led to his being appointed in 1869 to the see of Exeter, where he won for himself great popularity by his sincerity and humanity. He was appointed Bishop of London in 1885, and in 1896 Archbishop of Canterbury. Among the ideals which T. had much at heart was the cause of temperance. He worked hard to prevent the influence of the Oxford movement from resulting in a split within the fabric of Anglicanism. See lives by W. F. Aitken, 1903, and E. G. Sandford (ed.), 1906.

Temple, Henry John, see PALMERSTON. **Temple, Shirley Jane** (1929–), Amer. child actress, b. Santa Monica, California. She made her screen début in 1932 in *Red Haired Alibi*. She was a leading figure in the *Baby Burlesque* series. Her appearance in *Stand Up and Cheer*, 1934, resulted in a highly successful career; she is probably the best-known child star ever to appear in films. Her pictures include *Baby Takes a Bow*, *Bright Eyes*, *Little Miss Marker*, *Now and Forever*, *The Little Colonel*, *Our Little Girl*, *Curly Top*, *The Littlest Rebel*, *Captain January*, *Poor Little Rich Girl*, *Dimples*, *Stowaway*, *Wee Willie Winkle*, *Heidi*, *Rebecca of Sunnybrook Farm*, *Just Around the Corner*, *The Little Princess*, *Susannah of the Mounties*, and *The Blue Bird*. With the passing of childhood her popularity faded, although she did make a number of later films.

Temple, Sir William, Bart. (1628–99), statesman and man of letters, b. London. Educ. at Emmanuel College, Cambridge, he travelled in his youth, and in 1655 married Dorothy Osborne (q.v.). In 1666 he was created baronet, and appointed envoy at Brussels. He was largely responsible for carrying through the triple alliance formed against Spain in 1668 between England, Holland, and Sweden. He was later ambas. at The Hague, but



SIR WILLIAM TEMPLE

was recalled in 1670. Four years after he returned to The Hague to arrange a marriage between Princess Mary of England and Wm of Orange. He was offered a secretaryship of state in 1677 and 1679 but declined. When he removed to Moor Park he engaged Swift as his secretary, and was assisted by him in the composition of his *Memoirs*. His *Miscellanea* were pub. in 1680 and two more series in 1692 and 1701. T.'s essays and reflections are exquisitely polished and graceful, perhaps owing something of their style to Swift's pen. His originality lies in his economic

theories, and his ideas on labour and trade were of particular importance. See lives by T. P. Courtenay, 1836; F. I. Herriot, 1893; M. L. R. Beavan, 1908; C. Marburg, 1929. See also R. J. Allen, *Swift's Earliest Political Tract and Sir William Temple's Essays*, 1932.

Temple, William (1881-1944), prelate, b. the Palace, Exeter, son of Frederick T. (q.v.), and educ. at Rugby and Balliol College, Oxford. T. was fellow and lecturer in philosophy at Queen's College, Oxford, 1904-10. He was ordained priest in 1909, and was chaplain to the Archbishop of Canterbury, 1910-21. T. was headmaster of Repton School, 1910-14, rector of St James's, Piccadilly, 1914-18, and canon of Westminster 1919-21. He was Bishop of Manchester, 1921-9, and was appointed Archbishop of York and a privy councillor in 1929. T. became Archbishop of Canterbury in 1942. As a writer, T.'s fame will rest chiefly on his essays in philosophy and on his application of that philosophy to social and economic problems. The two vols. of his *Readings in the Gospel of St John*, 1939, show his deep devotion. His Gifford Lectures, delivered at Glasgow Univ. while he was Archbishop of York and collected under the title *Nature, Man, and God*, 1934, are an outstanding contribution to theology. Among his more important pubs. may be mentioned *The Kingdom of God*, 1912, *Plato and Christianity*, 1916, *Mens Creatrix*, 1917, *Faith and Modern Thought*, 1921, *Christus Veritas*, 1924, *Christianity and the State*, 1928. His other works include *Christian Politics and Kindred Subjects*, 1927, *Christianity and the Social Order*, 1932, *Citizen and Churchman*, 1941, and *The Resources and Influence of English Literature* (being the first ann. lectures delivered before the National Book Council, of which he was a vice-president, 1943). The motif of T.'s life was the faith and discipline of the Anglican Church. He led the Life and Liberty Movement which resulted in the Enabling Act, 1919, and the setting up of the Church Assembly (q.v.). To T. the unity of the Church was an urgent and practical necessity, not merely a pious hope or an intellectually necessary end to the Christian interpretation of history. But he made his greatest impact on the public mind by his pronouncements on Christian social theory, having, indeed, started life as a Christian Socialist. Many of his pronouncements were the cause of controversy; but his zeal and energy did much to stimulate active Anglican and Christian life, while his political opponents recognised his sincerity, humility, and deep sense of social justice. See life by F. A. Iremonger, 1948.

Temple, Eng. earldom, held from 18th cent. by the Grenville family together with the dukedom of Buckingham and Chandos. The first earl was Richard Grenville (1711-79), eldest son of Richard Grenville (1678-1728) and Hester T., afterwards Countess T.; succeeded to his mother's peerage in 1752 and took the name of Grenville-T., M.P. (1734). *George Nugent Temple-Grenville* (1753-1813), second son of

George Grenville and nephew of the 1st Earl T., succeeded his uncle as 2nd Earl T. in 1779. He was created Marquess of Buckingham in 1784 and was a lieutenant of Ireland. His son, *Richard Temple Nugent Brydges Chandos Grenville* (1716-1839), became 1st Duke of Buckingham and Chandos and Earl T. of Stowe (1822). His son, *Richard Plantagenet Temple Nugent Brydges Chandos Grenville* (1797-1861) was 2nd Duke of Buckingham and Chandos (q.v.). His successor, Richard, the 3rd Duke (1823-99) was colonial secretary, 1866-8. On his death the dukedom became extinct. His titles of Earl T. and Viscount Cobham passed to relatives. The 6th Earl T. of Stowe (succeeded 1940) was b. in 1909.

Temple, city of Bell co., Texas, U.S.A., situated in a cotton-growing dist. 35 m. SSW. of Waco. It was founded in 1881, and chartered as a city in 1884. Pop. 25,500.

Temple, London, see INNS OF COURT.

Temple, structure designed for the worship of a deity or deities. The first *templum* of the Romans was simply the space of earth and sky marked off by an augur for divination. The anc. Egyptians built enormous T.s by degrees over a long period; anc. India is noted for cave T.s hewn out of the solid rock; but the most celebrated T.s of antiquity were those of the Greeks. In the Far E. and in SE. Asia the T. is known as *pagoda*, while the anc. Mexican T. was known as *teocalli*. In France Protestant churches are known as T.s as also are some Jewish synagogues and Masonic halls.

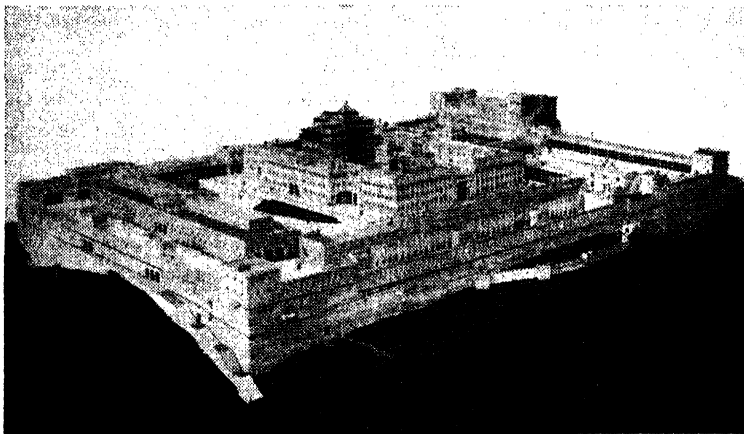
See ARCHITECTURE I, II, III; ATHENS; AZTECS, THE; BUDDHA AND BUDDHISM; INDIAN ARCHITECTURE; JAPANESE ARCHITECTURE; MAYA; OLYMPIA; PARTHENON; THEBES; UR; ZIMBABWE.

The Jewish Temple. The sacred edifice of the anc. Hebrews, erected at Jerusalem on Mt Moriah, one of the hills of Mt Zion. *Solomon's Temple.* The idea of building the T. was suggested to the mind of David, but it was Solomon, his son and successor, who commenced the work in the fourth year of his reign. The building of the T. required 7 years. The T., whose building was directed by Phoenician craftsmen, was of imposing character. It is described in detail in the Bible (1 Kings vi, vii; 2 Chron. iii-v) and by Josephus (*Ant.* viii, iii). The rock-altar (see below) is the only remains still preserved. The site of the T. lies to-day within the sacred enclosure of the Muslims known as the Haram esh-Sherif ('The Noble Sanctuary'). The most striking natural feature of the Haram is the anc. rock-altar (a great outcropping of rock), known as es-Sakhra ('sacred rock'), and covered by the Kubbet es-Sakhra ('Dome of the Rock'). One can still trace on this rock the channels which conducted the blood to an opening which in turn conducted it to a sacred cave underneath. *The Second Temple*, built on the same site, by Zerubbabel, was completed in 516 BC, 70 years after the first T. was destroyed. It was probably without ornaments, and was as nothing in the eyes of those who

had seen the T. in its former glory. *The Herodian Temple* (described by Josephus, *Ant. xv, xi*, and *Wars v, v*, and in the Babylonian Talmud, *Qodashim, Middoth*) was begun in 20-19 BC, and was finished in AD 64, 6 years before it was finally destroyed. According to Tacitus, it was 'a temple of immense wealth.' The 'Western' or 'Wailing Wall' (q.v) belongs to the remains of the enclosure-walls of the Herodian T.

Temple Bar, formerly a gateway marking the boundary between the cities of London and Westminster. A barrier existed here in medieval times after the city of London extended beyond the old wall. It was removed in 1669, and in 1670-2 a new archway was erected to

years later he was a Lieutenant-gen. Subsequently in that war he commanded the 1st and 56th divs. and the 6th armoured div. After the War he was serving as G.O.C. Eastern Command when the need arose for a 'strong man' in Malaya, where a communist terror campaign was disrupting the life of the country. He was sent as High Commissioner, with broad military powers, and soon his vigorous and original measures brought much needed relief. The situation has so improved that terrorist incidents are now negligible. In 1955 T. succeeded F.-M. Sir John Harding (q.v.) as C.I.G.S. He was promoted F.-M. in 1956. In Feb. 1958 Gen. F. W. Festing succeeded T. as C.I.G.S.



E.N.A.

A RECONSTRUCTION OF HEROD'S TEMPLE

Wren's designs. Soon after there began the practice (discontinued in 1772) of exhibiting the heads of executed criminals. It was removed in 1878 and later re-erected at Theobald's Park, near Cheshunt, Herts, and the site is marked by the Temple Bar Memorial. In former times the sovereign sought permission of the lord mayor at T. B. before entering the city of London, and the act continues to be symbolically performed.

Templemore, mkt tn of co. Tipperary, Rep. of Ireland, 34 m. N. of Clonmel, at the foot of Devil's Bit Mt (1577 ft). Loughmoe Castle and Barna Castle are nearby. Pop. 2000.

Templer, Sir Gerald Walter Robert (1898-), soldier, educ. at Wellington and Royal Military College. He joined the Royal Irish Fusiliers (of which regiment he later became Colonel) in 1916, and served in France and Belgium. Between the wars he served in Persia, Iraq, and Palestine as well as at home, and was a lieutenant-colonel at the outbreak of the Second World War, in France. Two

Templewood, Samuel John Gurney Hoare, 1st Viscount T. of Chelsea (1880-), statesman and diplomat, educ. at Harrow and at New College, Oxford. From 1910 until 1944 he was Conservative M.P. for Chelsea. He was secretary of state for air from 1922 to 1924, and from Nov. 1924 to 1929, and secretary of state for India from 1931 to 1935. He then became foreign secretary, but resigned, owing to the violent criticism evoked by the Hoare-Laval pact. Later, he held successively the posts of home secretary and secretary for air, and from 1940 to 1944 was ambas. in Spain. His *Ambassador on Special Mission*, 1946, is an account of his efforts to maintain the neutrality of Franco Spain. In 1944 he was created a viscount. T. is deeply interested in penal reform. Other pubs. include *The Shadow of the Gallows*, 1951, and *Nine Troubled Years*, 1954.

Tempo (It. 'time'), musical pace. The speed of any musical composition, determined, not by the note-values used by the composer, which are relative, but by

the directions set above the stave at the opening of a piece or section (e.g. *allegro*, *andante*, *adagio*, etc.). These words cannot fix the exact pace required by the composer; this can be done only by means of metronome marks (e.g. ♩ = 96, i.e. 96 crotchets to the minute, etc.).

'Tempo, II,' Italian daily newspaper, estab. in Rome by Renato Angiolillo in 1944. It soon became one of the leading Italian dailies representing right-wing opinion, and has now a circulation of 175,000.

Temporal Power, see PAPAACY.

Temporary Rank, see RANK.

Temse (previously Temsche; Fr. Tam-ise), tn in the prov. of E. Flanders, Belgium, on the R. Scheldt, 10 m. SW. of Antwerp. It has shipyards for barges and trawlers. Chief manufs. are lace, baskets, ropes, and cotton goods. There is some good baroque architecture. Pop. 14,300.

Temuchin, see GENGHIS KHAN.

Temuco, city of Chile, cap. of the prov. of Cautin, 430 m. S. of Santiago and 106 m. NE. of Valdivia. Cereals, timber, and apples are the main products. It is the H.Q. of the S. Amer. Missionary Society. T. is a cathedral city at the gateway to the Chilean Lake Dist. The Araucanian Indians still use it as their chief mkt. It is rapidly becoming modernised, and is an important rail centre; it also has a military airport. Pop. 38,000.

Ten, Council of, secret committee of the Venetian Senate, estab. in 1310 and vested with such a measure of executive authority as was deemed effective to cope with extraordinary crises. Its institution marked the final overthrow of the democratic constitution, in favour of a system of close oligarchies of hereditary aristocrats. After the defeat of Tiepolo's revolution (1310) against the growing exclusion of so many Venetians from any share in the gov., the aristocratic element deemed it advisable that the Great Council, then composed almost entirely of the nobility, should elect 10 of its members, the Doge, his council, and the Supreme Court another 10, and that from these the Great Council should make a final selection of 10 to act as a committee of public safety. Eventually the C. of T., though theoretically outside the constitution, became the most powerful organ of gov. It was not finally abolished until 1797, the date of the fall of the rep.

ten Brink, Bernhard, see BRINK.

ten Brink, Jan, see BRINK, JAN TEN.

Ten Commandments, see DECALOGUE.

Ten Thousand, Expedition of the. In anct Gk hist. the 'Ten Thousand' were an army originally composed partly of large levies of native troops in the Persian satrapies of Asia Minor, but mainly of Gk mercenaries collected by Cyrus, younger son of King Darius II of Persia, who hoped to win the crown from his elder brother Artaxerxes II. At the battle of Cunaxa (401 BC) the Greeks routed their opponents, but Cyrus was killed. The native levies at once dispersed, and the Gk mercenaries found themselves marooned in Mesopotamia. Their officers were killed by a trick of the

enemy. The Greeks chose new officers, among them Xenophon (q.v.), the historian of the expedition, and fought their way N. into the Armenian mts. Ultimately they reached the Euxine at Trapezus (Trebizond). A graphic account of the remarkable wanderings of the Ten Thousand is contained in the *Anabasis* of Xenophon.

Tenacity, see ELASTICITY; STRENGTH OF MATERIALS.

Tenant, see LANDLORD AND TENANT.

Tenants in Common, see COMMON, TENANCY IN.

Tenasserim: 1. Tn of Lower Burma on the T. R.

2. Div. of Lower Burma, consisting of a narrow strip of land lying to the E. of the Bay of Bengal. There is a heavy rainfall, and where cultivation is possible, rice is grown. Some tin is mined. Cap. Moulmein. Area 35,886 sq. m.; pop. 2,111,000.

Tenby, Gwilym Lloyd George, first Viscount (1894-), Brit. politician, educ. at Eastbourne College and Jesus College, Cambridge. He served in the First World War, and entered Parliament as a Liberal in 1922. He was minister of food, 1941-2, and minister of fuel and power, 1942-5. In 1951 he was returned as a Liberal and Conservative M.P. and joined the Conservative gov. as minister of food, 1951-4. From 1954 until 1957, when he was created a viscount, he was Home Secretary and minister for Welsh Affairs.

Tenby, municipal bor. and seaside resort of Pembrokeshire, Wales, 9 m. E. of Pembroke. It is situated on a narrow promontory jutting out into Carmarthen Bay. T. has a long hist., and by the late 15th cent. was a prosperous little port. Part of the castle and most of the tn walls still exist. Pop. 4500.

Tench (*Tinca tinca*), European freshwater fish with exceedingly small scales, abundant secretion of mucus, and the presence of a short barbel at each angle of the mouth. It is rich olive green in colour, shading into light grey on the belly. It spawns in early summer, the greenish ova numbering about 250,000. Like the carp, to whose family it belongs, it feeds on both animal and vegetable substances. It attains a length of about 18 in. and a weight of 4 lb.

Tende, Col de, Alpine pass, leading from Limone, in the It. prov. of Cuneo (q.v.), to Tende, which (since 1947) is in the Fr. dept of Alpes-Maritimes (q.v.). It has a road tunnel 3360 yds long.

Tender, in law, offer of money in payment of a debt. To be valid it must be: (1) Unconditional; but a T. will not be invalid merely because it is made under protest. (2) Of the whole debt; though if the creditor's claim is made up of separate items the debtor may validly make a T. of payment of any one item provided he makes it clear in respect of which item it is made. (3) In the current coin of the realm. Bank of England notes of £1 and 10s. are legal T. in Great Britain and N. Ireland to any amount; those of £5 in England and Wales only. Change cannot be demanded except from the Bank

of England. Gold (dated 1838 onwards), if of or over the least current weight, is legal T. to any amount. Silver (dated 1816 onwards) is legal T. up to 40s., nickel brass 3d. up to 2s., and bronze (introduced 1860 to replace copper) up to 12d. A valid T. does not extinguish the debt, but it exposes the creditor in his action against the debtor as the litigious oppressor, and a plea of T., if sustained by the debtor, will assuredly result in the plaintiff having to pay the costs of the action. But the defendant, if he pleads T., must pay the amount into court. The other effects of T. are that it stops the further accrual of interest, and extinguishes any right of lien (q.v.) the creditor may have. T. in commerce is a written offer of terms for executing a specific piece of work or for supplying a certain consignment of merchandise. For T. of amends in libel see DEFAMATION.

Tendon, see under MUSCLE.

Tendon of Achilles, tendon attaching the muscles of the calf of the leg to the heel-bone. It is capable of resisting a great tensional strain, and yet is sometimes ruptured by the contraction of the muscles in sudden extension of the foot. Ant. surgeons regarded wounds in this tendon as fatal, probably because of the legend of Achilles. It was so called from the hero Achilles, whose mother dipped him when an infant into the Styx, so that he became invulnerable except in the heel by which she held him.

Tendrill, in botany, a thread-like growth by which some plants climb. T.s may be modified terminal shoots, as in vines, leaves as in peas, leaf-stalks as in clematis, or branch stems as in white bryony; they are sensitive to contact and react by twining round supports, climbing and giving leaves and flowers more light.

Tenebrae (Lat. *Tenebrae*, darkness), name popularly given to the solemn recitation of the canonical hours of Matins and Lauds during the last 3 days of Holy Week, and so timed as to finish as it is growing dark. Distinctive features are the extinction of a candle at the end of each psalm, and the making of a slight noise at the end of Lauds, typifying the earthquake felt on the death of Christ (Matt. xxvii. 51).

Tenedos, Turkish is. in the Aegean Sea, near the entrance of the Dardanelles. Area 16 sq. m.

Tenerife, or **Teneriffe**, largest of the Canary Is., in the prov. of Santa Cruz de Tenerife (q.v.). It is divided in two by a mt chain. The volcanic Pico de Teide rises to 12,180 ft. The flora is very varied, and the is. is known for early fruits and vegetables, and for bananas. It is a popular tourist and health resort. The cap. is Santa Cruz de Tenerife. Area 780 sq. m.; pop. 280,000.

Tengri Khan, see KHAN-TENGRI.

Tengri-Nor, or **Neimo**, lake of Tibet. It is 80 m. N. of Lhasa and has an area of 950 sq. m. Altitude 15,400 ft.

Teng-yüeh, or **Momein**, tn of Yunnan, China, 135 ENE. of Bhamo (Burma). Pop. 6000.

Teniers, David, the Elder (1582-1649), Flem. painter, b. Antwerp. He studied painting under Rubens and Adam Elsheimer at Rome. His subjects were mainly religious; as a painter of Flem. life he was eclipsed by his son and pupil, T. the younger (q.v.).

Teniers, David, the Younger (1610-90), Flem. painter, b. Antwerp, the son of David T., the Elder, from whom he received his prin. instruction. He was a master in the Antwerp Guild (1632-3). He was appointed court painter to Archduke Leopold and keeper of his pictures. His work was a development of his father's style influenced also by Brouwer (q.v.), and was extremely popular. He was happiest in his portrayals of small figures in landscape or rustic interiors. His best picture, 'Meeting of the Civic Guards,' is at Leningrad, while his 'Village Fête' and many other works are in the National Gallery, London.

Tenison, Thomas (1636-1715), prelate, b. Cottenham, Cambs, and educ. at the Grammar School, Norwich, and at Corpus Christi College, Cambridge. He was made minister of St Andrew's, Cambridge, and rector of Holywell in Hunts; and in 1680 was presented to the living of St Martin-in-the-Fields, London. In 1689 he was made archdeacon of London, in 1691 he became Bishop of Lincoln, and in 1694 Archbishop of Canterbury. In St Martin-in-the-Fields he endowed a free school and founded a library. T. was strongly Whig and Protestant in sympathy. As such he secured favour under William III, and was never popular with Anne, or with his High Church Convocation. He worked zealously to improve the quality of parochial Anglicanism, and was a supporter of missionary endeavour. See life by E. Carpenter, 1949.

Tennant, Emma, see OXFORD AND ASQUITH.

Tennant, Kylie (1912-), Australian novelist, b. Manly, New S. Wales. Educ. at Sydney Univ., she married Lewis C. Rodd in 1932. Her first novel, *Tiburon*, 1935, and *The Battlers*, 1941, both won the Prior Memorial Prize, and the latter was also awarded the gold medal of the Australian Literary Society. Others of her novels are *Foveaux*, 1930, *Ride On, Stranger*, 1943, *Time Enough Later*, 1943, *Lost Haven*, 1946, and *The Joyful Condemned*, 1953. In these she depicts with irony and gusto the life of the Australian poor. She also wrote a number of plays, and *Australia, her Story*, 1953. See also AUSTRALIAN LITERATURE.

Tennant, Smithson, see DIAMOND.

Tennessee, central S. state of the U.S.A., having an area of 42,246 sq. m. It is known as the Volunteer State. Its boundaries on the N. are Kentucky and Virginia; on the E. N. Carolina; on the S. Georgia, Alabama, and Mississippi; and the Mississippi R. on the W. separates it from Arkansas and Missouri. Along the E. boundaries rise the Unaka and Great Smoky Mts, with peaks over 6000 ft high, whilst between these highlands and the Cumberland Plateau, the mean elevation of which is 1800 ft, is the

valley of E. T. (watered by the upper reaches of the 652-m.-long T. R. (q.v.), scene of the T. Valley Authority project, and its tribs.), part of the Great valley of the Alleghenies. The Cumberland R., affluent of the Ohio, waters a fertile valley W. of the Cumberland Mts in the N. of the state. There are wide level tracts in the W. between the Mississippi and the lower T. The state enjoys a pleasant climate, the average ann. fall of snow being 8 in. and of rain 52 in. The mean extremes of temp. are 38° F. in the winter and 78° in the summer. Almost half is still woodland, and lumbering and timbering bring in a large revenue; national forest lands cover some 564,471 ac. Cultivated lands are dispersed over the rest, there being 18,534,380 ac. of farmland in 1950. The best crop is maize (63,500,000 bushels in 1947), though conditions favour the growth of wheat, oats, potatoes, and peanuts. Tobacco and cotton are the chief cash crops. Hay, sweet potatoes, sorghum, and fruits, especially strawberries, are also cultivated. Agriculture is the largest single industry, and owes its new prosperity, to a large extent, to the T. Valley Authority. Stock raising has declined since the beginning of the cent., but is still important, especially in the Nashville Basin and Great Appalachian area. The fields of bituminous coal cover an area of over 4400 sq. m. Other mineral products are pyrites (first in the U.S.A.), phosphate (second), iron, copper, lead, zinc, manganese ore, clay, marble, and limestone. There are flour and grist mills, sawmills and foundries, blast furnaces, textile factories, and tobacco, cotton seed, oil and cake, and leather are prepared. Nashville is the cap. (pop. 174,307), but the largest city is Memphis (396,000), whilst Chattanooga (131,040) and Knoxville (124,770) are also important. Norris Dam is 27 m. N. of Knoxville. During the Second World War production of the atomic bomb was carried out at Oak Ridge, a 'new' tn 9 m. from Norris Dam, built specially to house the workers. It was opened to the public in Mar. 1949. T. has good rail and air services, and in the Mississippi and the T. Rs. has excellent natural waterways. Education is compulsory and there are 49 univs., colleges, and professional schools, including 8 for Negroes. The state univ. is at Knoxville. The leading religious denominations are S. Baptists, S. Methodists, and Negro Baptists. T. was explored by De Soto in 1540, and first settled in 1757, as part of N. Carolina. It had its first settlement in the Watauga Valley, led by James Robertson in 1769; admitted to the Union in 1796; seceded, 1861; readmitted, 1866. Its General Assembly consists of a Senate and a House of Representatives; it is represented in Congress by 2 senators and 9 representatives. Pop. (1950) 3,291,718. See T. Oldland, *Tennessee*, 1946. See also TENNESSEE VALLEY AUTHORITY.

Tennessee River, trib. of the Ohio, U.S.A. The Holston and French Broad, which unite near Knoxville, Virginia, are

the headstreams. The T. winds through E. Tennessee, Alabama, W. Tennessee, and Kentucky, and finally reaches the Ohio at Paducah. It is now navigable from the mouth 635 m. upstream. Length 652 m.

Tennessee Valley Authority (T.V.A.), created by the Tennessee Valley Act in 1933. The authority initiated regional planning on a scale never previously attempted. Among the reasons why the Tennessee Valley was selected as the site of this great experiment was the existence of a large gov.-built nitrate plant, the Muscle Shoals nitrate works at the Wilson Dam, built during the First World War. Proper control of the Tennessee R. was also crucial for the prevention of disastrous floods on the lower Mississippi. There was further the consideration that flood control could be readily related to improved navigation and to the profitable generation of electric power; and the needs of this backward region could largely be met by cheap electric power, which was supplying 145 municipalities and rural power co-operatives in 1951. The Tennessee valley used to be known as one of the most depressed areas of the U.S.A., affecting parts of the states of Alabama, Kentucky, Missouri, Virginia, Georgia, and N. Carolina. Its disastrous state was due to reckless exploitation by early settlers: the soil was barren and the woods had been cut down; the rivs. frequently flooded. Under the T.V.A. water control was begun. A total of 27 dams was built, and facilities for river traffic improved. Co-ordinated research plans were undertaken throughout the entire area, which is approximately 45,000 sq. m. Soil regeneration, afforestation, malaria control, and similar measures were scientifically applied. National parks were laid out, tourist facilities organised, and cultural and educational activities promoted. The whole project affords a valuable lesson in the possibilities of judiciously applied regional planning, though it was opposed by numbers of influential interests. It should be pointed out that the financial structure of the project has been severely criticised by orthodox economists. Over \$900m. had been spent by T.V.A. by the end of the 1951 financial year, and had increased the income of over 3,000,000 people who had previously been below the 'poverty line.' The ann. revenue for the fiscal year 1951 was \$70,300,000.

Tenniel, Sir John (1820-1914), cartoonist and illustrator, b. London. T. studied at the Royal Academy Schools. His first serious picture appeared at the exhibition of the Society of Brit. Artists in 1836. His design for a mural decoration of the new palace of Westminster in 1845 resulted in his being commissioned to paint a fresco in the House of Lords. Meantime his reputation as a humorous artist had grown, and in 1850 Mark Lemon invited him to succeed Richard Doyle as joint cartoonist with John Leech in *Punch*, his illustrations to Aesop's *Fables* having attracted much attention. His first cartoon was 'Lord Jack the Giant-Killer,' representing Lord John

Russell attacking Cardinal Wiseman. Some 2300 cartoons and many smaller drawings were executed by T. before he severed his connection with *Punch* in Jan. 1901. In them can be traced a political hist. of the period (see illustration in article GREAT BRITAIN). His drawing and the originality of his conceptions coupled with his sense of humour make him unrivalled as a cartoonist. His illustrations for Lewis Carroll's *Alice in Wonderland*, 1865, and *Through the Looking-Glass*, 1872, have delighted children of all ages, and are his greatest claim to fame. He was knighted in 1893. See C. Monkhouse *The Life and Works of Sir John Tenniel*, 1901; F. Sarzano *Tenniel*, 1948.

Tennis, one of the oldest ball games in existence, is often called real T., royal T., or court T. to distinguish it from lawn T., a game which was evolved from T. about 1870. Even in 1100 the game is known to have resembled very closely the T. of to-day.

The royal T. court at Hampton Court is the oldest place in the world where a ball game is still played. It was built in 1529 by Henry VIII, and has served as a model for all later courts erected in England. Henry VII and Charles II were good players. Edward VII played at Princes' when Prince of Wales. Among other courts in active use to-day are those at Lord's and Queen's in London, and at Manchester, Leamington, Oxford, Cambridge, Moreton, Murrel, and elsewhere. The game has been ousted in general popularity by lawn T. and squash owing to the expense of building and maintaining a court.

Regulation courts measure 96 ft by 31 ft 8 in. Round the 2 ends and along one of the side walls runs the penthouse, a sloping roof over the dedans, galleries, and grille. (It is 7 ft wide and is 7 ft 1½ in. high at the side of the court and 10 ft 7 in. at the farther edge.) Across the middle of the court is stretched a net, 5 ft high at the sides and 3 ft in the centre. In the back wall on the service side is a large rectangular opening—the dedans. On the back wall of the hazard side is a small square opening—the grille. A ball struck so that it enters the dedans, the grille, or the gallery on the hazard side farthest from the net, known as the winning gallery, wins the point outright. On the main wall, near the grille, is a projection known as the tambour. The winner of the toss has choice of ends and usually takes the service side. A service to be good must strike the penthouse at least once on the hazard side of the court and drop into a prescribed area on the floor. The striker-out may volley the service or return it at first bounce. Basically the scoring is as in lawn T. except for a great number of variations; e.g. if the server fails to touch the ball with his racquet when it is returned, the marker watches where the ball falls on its second bounce, and calls the chase, the floor being marked with chase lines for this purpose. That point is held in abeyance, and when 2 chases have been made the players cross

over, and the one who is now striker-out must make a better, i.e. shorter, chase in order to win the point. If he makes the same chase, the score remains unaltered, and the marker calls 'chase off.' If either player is at game point, they cross over if one chase is made.

A short chase is made by playing the T. 'stroke,' i.e. a heavily cut stroke that comes down sharply off the wall below the dedans. There are also chases on the hazard side. A set is the best of 11 games. The balls are solid, and should not be less than 2½ in. and not more than 2⅞ in. in diameter. They should weigh not less than 2½ oz. and not more than 2½ oz. There are no restrictions as to size or shape of racquets. The game is played by 2 or 4 players.

The first recognised world champion was Clerge (France, 1750). Pierre Etchebaster (France) was world champion from 1928 till he retired in 1955. The present world champion is Albert Johnson (Great Britain). Recent amateur champions are E. Baerlein (1914-27, 1929-30), L. Lees (1928, 1931, 1933-7, 1946), Lord Aberdare (1932, 1938), W. D. Macpherson (1939), Lord Cullen (1947), P. Kershaw (1948), Ogden Philp (1949), Alastair Martin (1950), Hon. M. G. L. Bruce (1953, 1954, 1956, and 1957), and R. C. Riseley (1955). See C. G. Heathcote, *Tennis, Lawn Tennis, Rackets, Fives*, 1903, and Lord Aberdare (ed.), *Rackets, Squash Rackets, Tennis, Fives and Badminton*, 1933.

Tennis, Lawn, see LAWN TENNIS.

Tennyson, Alfred, 1st Baron (1809-92), poet, b. Somersby, Lincs, son of the rector of Somersby, and younger brother of Charles Tennyson-Turner and Frederick T. (q.v.), who were both poets. He was educ. at Louth Grammar School and at Trinity College, Cambridge. It is only in recent years that research has shown how unhappy T.'s childhood and youth must have been. His father was eccentric and morose, and later became mentally unbalanced, and the whole family displayed neurotic tendencies. Biographers suggest that this background accounted for much of T.'s remarkable sensitivity and reserve in later years. In 1827 he pub., with his brother Charles, a vol. called *Poems by Two Brothers*, to which Frederick had also contributed. At Cambridge T. won the chancellor's medal for Eng. verse in 1829 with a poem on 'Tibuctoo,' and next year brought out a vol. of *Poems, chiefly Lyrical*. This contained some verse of great promise, and was favourably reviewed by Leigh Hunt, though Blackwood made some scathing criticisms. T. was deeply hurt by these, and sought an escape in a tour of France, Germany, and Italy with Arthur Henry Hallam (q.v.). From the pictorial impressions he gained on this tour he took the inspiration of many of his later poems. In 1833 he pub. a vol. which included 'The Lady of Shalott,' 'The Lotus Eaters,' and 'A Dream of Fair Women.' These were unfavourably reviewed by the *Quarterly*, but were liked by the general public, and T.'s work began to be known and admired by a small circle.

He pub. no more poetry for 9 years; this delay was partly due to his sensitive dislike of the bitter criticism which had been directed at his earlier work, but also because in these early years T. wrote far more slowly, and often with more discernment, than he did when he became famous. In 1842 he pub. *Poems*, in 2 vols., containing 'Locksley Hall' and 'Ulysses.' The *Princess*, 1847, a serio-comic poem, written mainly in epic

but work of this type was not his true *metier*, and it is by his lyrics that T. should be judged, though 'Maud' has scenes of great power and contains some of T.'s finest poetry. In 1859 *Idylls of the King*, variations in poetic form on the Arthurian romances, were pub. These contain some of T.'s loveliest descriptive passages, and have a music and a pathos which links them with the earlier 'Lady of Shalott.' T.'s Arthurian legends have not the vigour and fire of Malory's interpretation; but they possess a stately, rich grandeur equally effective in describing an ornately vivid tournament scene, the pathos of Elaine, and the final tragedy of the defeated Arthur. His later poems were *Tiresias*, 1885, *Locksley Hall, Sixty Years After*, 1886, *Demeter and Other Poems*, 1889, including 'Crossing the Bar,' and *The Death of Oenone*, 1892. From 1853 to 1869 he had lived at Farringford, Is. of Wight; he then built a house at Aldworth, near Haslemere, which was his home till his death. In 1884 he was raised to the peerage. He died in his 84th year, and received a public funeral in Westminster Abbey.

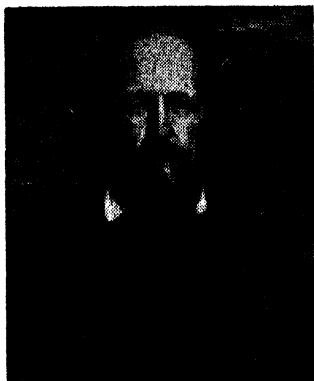
The poetry of T. is characterised by a wide outlook, by intense sympathy with the deepest feelings and aspirations of humanity, a profound realisation of the problems of life and thought, an exquisite sense of beauty, and a marvellous power of vivid and minute description often achieved by a single felicitous phrase, and heightened by the perfect matching of sense and sound. No poet has excelled him in precision and delicacy of language and completeness of expression. As a lyricist he ranks with the highest in Eng. poetry, and he even possessed a share of humour, as is shown in the 'Northern Farmer' and other pieces. Above all, he was the perfect mouthpiece of his age, both in its merits and its shortcomings; and for this reason his work was in the 20th cent. to meet with the same disfavour as became attached to 'Victorianism.' But when the volume, variety, and finish of his writings are considered, he must be ranked among the greatest Eng. poets. There are memoirs of T. by his son Hallam T., 1899, and his grandson Charles T., 1949. See also lives and studies by A. Lang, 1901; A. C. Lyall, 1902; H. Nicolson, 1923; H. Anson Fausset, 1929; also W. H. Auden, *Tennyson: an Introduction and a Selection*, 1946.

Tennyson, Charles, see TURNER, CHARLES TENNYSON.

Tennyson, Frederick (1807-98), poet, b. Louth, Lincs, eldest brother of Alfred, Lord T. (q.v.). Educ. at Eton and Cambridge, he passed most of his life in Italy and Jersey. He contributed 4 pieces to the *Poems by Two Brothers*, and pub. *Days and Hours*, 1854, *The Isles of Greece*, 1890, *Daphne*, 1891, and *Poems of the Day and Night*, 1895.

Tenor, see JOINERY.

Tenor: 1. Highest normal adult male voice, the compass being from tenor C to about treble B, i.e. an octave below soprano. It is so called because in old



N.P.G.

ALFRED LORD TENNYSON

Painting by G. F. Watts.

style, but embodying some of his finest lyrical fragments, was T.'s first great popular success, and this ran through 5 eds. in 6 years. But he achieved immediate, and nation-wide fame with *In Memoriam*, which he had begun in 1833, as an elegy to Hallam, who died in that year. The theme expanded under the poet's hands and so the work, while not ceasing to be personal, became a great religious poem as well. It expresses the spiritual conflict which followed upon his friend's death, and sets forth his faith in God, immortality, and the 'one far-off divine event to which the whole creation moves.' *In Memoriam* was pub. anonymously in 1850. It was praised lavishly on all sides, and T.'s improved financial position enabled him to marry Emily Sellwood, to whom he had been engaged for sev. years. This was an extremely happy marriage. In April 1850 Wordsworth died, and the poet-laureateship was offered to Samuel Rogers (q.v.), who declined it on account of his advanced age. T. was then offered the honour, and immediately accepted.

The 'Ode on the Death of the Duke of Wellington' appeared in 1852, and 3 years later the popular 'Charge of the Light Brigade' and 'Maud.' Of all poets laureate, T. was perhaps the best able to produce patriotic stanzas which possessed inspiration and real poetic quality;

polyphony it was the T. part which 'held' the *cantus firmus* (if any), around which the other parts were woven.

2. Instrument, especially the viola, playing part between bass and alto.

3. Tenor bell, the largest of a peal or set.
Tenrec, or Tailless Hedgehog, *see* CENTETES.

Tension. Newton's third law states that action and reaction are always equal and opposite. Where the action and reaction of 2 bodies tend to keep them apart, these constitute a thrust, but where they tend to keep 2 bodies together they constitute a T. A good illustration is a tug of war, the T. in the rope being the same everywhere. T. is measured in the same way as other forces—in pounds, or dynes in the C.G.S. (centimetre-gramme-second) system.

Tent, movable dwelling or shelter made of cloth, skins, or tree bark supported by poles and secured by ropes and pegs. T.s have been used by nomadic peoples since the dawn of hist. Those used by the Bedouin Arabs are made of strips of woven goat's hair and have changed little in construction since O.T. days. The *tepi* of the N. Amer. Indian is a conical-shaped T. made generally of skins or tree bark stretched over a tripod of poles. Also in the N. Amer. continent is found the flimsy summer skin T. of the Eskimo. Probably the most luxurious T. used by nomadic tribes is the Mongol *yurt*, a felt-covered dwelling with walls of latticed hurdles; richly embroidered felt curtains line the interior and form partitions. T.s have long been recognised as a means of housing troops in active service areas. In the W. world T.s are now generally used by people visiting open spaces, enabling them to remain independent of permanent dwellings. Modern T.s vary in size from the smallest one-man sleeping shelter to the marquee of many hundred ft in length, but have in common the fact that they are generally made of canvas suspended on a minimum framework of poles—sometimes only a single pole—and are held secure by adjustable guy-lines of cord or rope attached to pegs in the ground.

Tenterden, Charles Abbott, first Baron T. of Hendon (1762-1832), b. Canterbury. His father was a barber. Educ. at King's School, Canterbury, and Corpus Christi College, Oxford. He studied law, was admitted to the Bar, and became a special pleader. He was made recorder of Oxford in 1801, and in 1807 pub. his treatise *Law relative to Merchant Ships and Seamen*, which is still an authority in mercantile law.

Tenterden, municipal bor. (since 1449) of Kent, England, 18 m. SSE. of Maidstone, and a member of the Cinque Ports Confederation as a limb of Rye. Its 13th-cent. church (St Mildred's) is crowned by a lofty Perpendicular tower. T. forms a shopping centre for an agric. area. Pop. 4500.

Tenth: 1. The tenth part of the ann. income of an eccles. living which formerly went to the Pope, but at the Reformation was transferred to the Crown. Afterwards various benefices were exempted

from payment of T. altogether (*see under* QUEEN ANNE'S BOUNTY; TITHE).

2. In music, the octave plus a third; an interval comprehending 8 conjoint degrees, or 10 sounds, diatonically divided.

Tentyra, or Tentyris, *see* DENDERA.

Tenure, Feudal. Tenure is defined by Williams as the relation between feudal lord and tenant of land (*Real Property*). This is sufficiently accurate because the feudal system is the foundation of modern Eng. real property law, although the fabric of that system was effectually shattered in the early part of the 17th cent. The theory that all land was held mediately or immediately of the sovereign in return for either free or base services was essentially a Norman innovation into England adapted by the Conqueror from continental feudal institutions. In return for his loan of land the feudal tenant was bound to perform either *free* or *base* services. From these services were developed respectively freehold tenure and copyhold through tenure in villeinage. Of freehold tenures the most honourable was that of knight service. Most of the anct feudal incidents were abolished by the Statute of Tenures, 1660, which assimilated knight service to 'free and common socage'. Generally speaking, all the anct forms of tenure were abolished by the Law of Property Act, 1925. *See also* DE DONIS; ENTAIL; ESCHEAT; ESTATE; FORFEITURE; LAND; LAND LAWS; LANDLORD AND TENANT; and also under the various forms of tenure.

Tenzing Norgay, (1914-), Sherpa mountaineer who climbed to the summit of Everest (29,002 ft) with Edmund Hillary on 29 May 1953. B. at Tsa-chu, near Makalu, and bred in the village of Thami (12,000 ft) in Solo Khumbu, at 18 years of age he ran away from home to Darjeeling and became a mt porter. His expeditions are as follows: 1935: Everest, and Kabru in Sikkim. 1936: Everest, and Garhwal. 1937: Garhwal. 1938: Everest (when he carried loads to 27,200 ft), and Garhwal. 1939: Trich Mir in the Hindu Kush. 1946: Bandar Punch in Garhwal. 1947: N. side of Everest with Denman, and as sirdar to Kedarnath (22,770 ft, of which he made first ascent) and Satopanth (23,213 ft), both in Garhwal. 1948: Lhasa. 1949: Bandar Punch (20,720 ft, of which he made first ascent). 1950: Nanga Parbat. 1951: as sirdar to Nand Devi, when he climbed Nanda Devi E. (24,391 ft), and to the Kangchenjunga massif. 1952: twice to Everest, when he climbed with Lambert to 28,200 ft in May and to 28,575 ft in Nov. Tenzing received the George Medal after his ascent of Everest in 1953. He is now head of the Himalayan Institute of Mountaineering, a school of mt training centred at Darjeeling. Author of *Man of Everest*, 1955 (his autobiography as told to and written by J. R. Ullman).

Teccalli, *see* MEXICO, *Archaeological Research*.

Teotihuacán ('Abode of the Gods'), remains of an anct Toltec, 24 m. NE. of Mexico city. It is famous for its pyramids, which form the largest artificial

tumuli on the Amer. continent. The Pyramid of the Sun (216 ft) has terraced sides and wide stairs leading to the top; the Pyramid of the Moon is 140 ft high. There are also the remains of temples to Aztec gods. The remains cover an area of about 8 sq. m. See S. Linné, *Archaeological Research at Teotihuacan*, 1934.

Tephigram (*Té-gram*), thermodynamic diagram used in meteorology to complete (in a vertical direction) the weather analysis achieved horizontally in a weather map. It was introduced by Sir Napier Shaw, its name being derived from the main co-ordinates, temp. (*T*) and entropy (ϕ), q.v. If air expands (as it must in ascent, for pressure decreases with height) without absorbing heat from any source its temp. falls because of the work done in expansion. This is an 'adiabatic' expansion and the consequent rate of loss of temp. with height or 'lapse rate' is constant at 5.4° F./1000 ft. When the air has cooled to its dew point the water vapour it contains becomes saturated, and any further lifting above this level, called the condensation level, causes condensation into cloud droplets which are carried up with the rising air, and eventually rain or snow may be formed (see further under RAIN). The liberated latent heat of condensation warms the air somewhat, and the new 'saturated adiabatic' lapse rate is therefore less than the 'dry adiabatic' above, the difference being greatest at high temps., where most water vapour is available for condensation. The T. has 5 sets of lines on it: (1) slightly curved diagonal lines representing equal pressure; (2) vertical lines representing equal temp.; (3) dry adiabatics or lines of equal entropy, represented by horizontal lines; (4) saturated adiabatics, represented by curved lines which become almost parallel to the dry adiabatics at low temps. where there is little moisture in the air; and (5) steeply sloping lines representing humidity mixing ratio of saturated air (see further under HYGROMETER). A point on the T. can be defined by temp. and pressure, and it can therefore represent the state of a small parcel of air; and a line (the 'environment curve') can equally represent the state of the air at all levels. Vertical motion (i.e. between 2 pressure levels) is represented by a movement of the point along the appropriate adiabatic (saturated or dry); the dew point (which may be defined as the temp. to which the air must be cooled to achieve saturation) moves along a saturated mixing-ratio line, and where it meets the corresponding dry adiabatic is the condensation level. It is therefore easy to detect and measure on a T. the movement of air over colder and warmer surfaces, up and down hills and over or under other masses of air, and the ascent or descent caused by regional inflowing or outflowing.

Atmospheric Stability. If the environment curve shows a greater lapse rate than the corresponding adiabatic (dry or saturated according to whether the air is dry or saturated) air slightly disturbed will be warmer (and lighter) than its surroundings in ascent and cooler (and

heavier) in descent. Convection is then likely and the atmosphere is unstable. The greater the instability the more violent the convection, the most violent being in thunderstorms, tornadoes, and waterspouts (q.v.). If the lapse rate is less than the corresponding adiabatic the air is stable and no convection occurs. Limited depths of instability (e.g. near the earth on a sunny day) may be extended to great heights by convection reaching above the condensation level, with consequent decrease in adiabatic lapse rate for ascending air; instability may also develop by bodily lifting until much of the air becomes saturated. All these effects can be traced easily on a T.

Air Mass Analysis. Coming from different geographical regions, air masses (see METEOROLOGY) have distinctive environment curves on the T. The distinction is especially clear if 'Normand' curves formed by joining condensation-level points corresponding to each point of the environment curve are used. The Normand curves have the property of not changing their position relative to the curved saturated adiabatics throughout any lifting or descent, or even if any rain falls from or is evaporated into the air. One air mass lying over the top of another as in a front generally appears as a distinct discontinuity in the Normand curve, even if it appears to be quite smooth in the environment curve. The shape of the Normand curve can be altered only by radiation, which changes the pattern in lower levels or, very slowly, near cloud tops, by mixing, which tends to uniformity, or by horizontal inflow and out flow, which extends or squashes the pattern in height. T.s can thus help to identify air masses even if their previous hist. is unknown.

See W. N. Shaw, *Manual of Meteorology*, 1926; Admiralty, Hydrographic Dept, *Admiralty Weather Manual* (H.M.S.O.), 1938, 1941; D. Brunt, *Physical and Dynamic Meteorology*, 1939, 1941; S. Petterssen, 'Convection in Theory and Practice' (*Geofysiske Publikasjoner*, Oslo, vol. xvi, No. 10), 1946.

Tephilin, see PHYLACTERIES.

Tepec, cap. of the state of Nayarit, 415 m. NW. of Mexico City. It is a popular spa, and manufs. include cotton-stuffs, coffee, sugar, and cigars. It is the centre of a mining area and has rail and air facilities. Pop. 17,600.

Teplíce (or **Teplíce-Sanov**; Ger. **Teplitz-Schönau**), Czechoslovak tn in the region of Ústí nad Labem (q.v.). It is in the Biela valley at the foot of the Erzgebirge (q.v.), and is a popular spa. The dist. has coal mines, and T. has sev. manufs., including paper, glass, and pottery. Pop. 45,200.

Teplitz (-Schönau), see TEPLICE.

Teramo: 1. Prov. of Italy, in NE. Abruzzi e Molise (q.v.). It is mainly in the Apennines (q.v.) and has high mts in the SW. (Gran Sasso d'Italia, q.v.) and W. There is a coastal plain on the Adriatic in the E., and there are many fertile riv. valleys; the chief rivs. are

the Tordino and Vomano. The prin. tns include T. and Atri (qq.v.). Area 770 sq. m.; Pop. 275,000.

2. It. tn. cap. of the prov. of T., on the Tordino, 26 m. N.E. of L'Aquila (q.v.). It has a cathedral with a remarkable 14th-cent. Gothic portal, and there are Rom. remains. Textiles are manuf., and there is a trade in agric. produce and wine. Pop. 38,500.

Teraphim, biblical term of uncertain etymology, indicating probably small portable images (Gen. xxxi. 19, 35) such as have been dug up often in the course of excavation. They were household deities, and may have constituted a sort of legal title of ownership for the house. They have often been compared to the Rom. *lares* and *penates*, which were supposed to protect the home and bring it good luck. The T. were closely associated with the practice of divination (1 Sam. xv. 23; Zech. x. 2); would drive away evil spirits and plague demons (1 Sam. xiv. 13).

Teranda, see PRIZREN.

Teratology, science dealing with abnormal developments of formations of parts of the body, and with monstrosities. See ALBINISM; BOTANY; CLUBFOOT; DEFORMITY; DWARF; GALLS; GIANTS; HERMAPHRODITE; HERNIA; HYBRID; PATHOLOGY; etc.

Terbium, metallic chemical element, symbol Tb, atomic number 65, atomic weight 159.2. It is a member of the group of rare earths (q.v.).

Ter Borch, Terborch, or Terburg, Gerard (1617-81), Dutch painter, b. Zwolle. He studied under his father, Geert Ter Borch, and later in Haarlem under Molijn, and in Italy and France, and visited England, Germany, and Spain. One of his masterpieces, 'Peace Congress of Münster,' is in the National Gallery, London. He painted many distinguished interiors with figures, 'The Letter' (collection of H.M. the Queen) being an example. He delighted in rich costumes, and bathed his pictures in a clear, silvery tone. See lives by F. Hellens, 1911, and W. Rothes, 1921.

Terce, in Scots law, a real right whereby a widow who has not accepted any special provision is entitled to a liferent (q.v.) of one-third of the heritage owned by her husband at the date of his death. The corresponding right of a widower to a liferent of his wife's heritage is called *Courtesy*.

Terceira, see AZORES.

Terebene, colourless liquid consisting of terpene and other hydrocarbons. It is prepared by treating turpentine with successive quantities of sulphuric acid and distilling the product. The smell of T. resembles thyme or pinewood, and it is used as an antiseptic and deodoriser.

Terebinth, or *Turpentine Tree*, see PISTACIA.

Teredo, Ship Worm, Woodworm, or Pileworm, genus of lamellibranch molluscs with a long worm-like body clothed in a thin shelly tub or sheath. The true bivalve shell is small and occurs at the thicker end where it protects the various organs. At the more slender end are 2

tubes, one of which conveys water to the gills and the other expels it with excavated matter. With its shell valves it bores into timber, and is very destructive to ships, piers, and submarine cables. From 1914 to 1920 it caused damage in San Francisco Bay estimated at \$10m. Francis Drake's *Golden Hind* was destroyed by the T.

Terek, riv. in the Caucasus, rising S. of Kazbek Mt. It traverses the main Caucasian range through Dar'yal gorge, flowing NW. until it reaches the lowland, then E. into the Caspian Sea. Length 350 m.

Terence (Publius Terentius Afer) (c. 195-159 BC), Rom. comic poet, b. Carthage, probably of Libyan stock. Brought to Rome as a slave by P. Terentius Lucanus, he received a good education and was afterwards manumitted. Six of his plays are extant: *Andria*, 166, *Hecyra*, 165, *Heautontimoroumenus*, 163, *Eunuchus*, 162, *Phormio*, 162, and *Adelphi*, which was first performed at the funeral games of L. Aemilius Paulus, 160. Four of these are adaptations from Menander, 2 from Apollodorus. Supreme both in point of style (simpler and more elegant than that of Plautus) as well as of dramatic skill (plot and character-study), T. influenced many later writers, including Molière. The best edition is that of R. Kauer and W. M. Lindsay, 1926. See G. Norwood, *Terence*, 1923; W. Beare, *The Roman Stage*, 1950.

Teresa, or *Theresa*, St (1515-82), Sp. nun and monastic reformer, b. Teresa Cepeda de Ahumada, at Avila. She entered a Carmelite convent in her native tn in 1533; but seeing the relaxation of discipline within the religious orders, she determined on reform, and set about founding a house in which all the original rules of the Carmelite order would be observed. She met with great opposition from clerical and lay authorities, but having obtained permission from the Pope, she estab. (1562) the anct Carmelite rule at a small house in Avila which she dedicated to St Joseph. Here the sisters (at first only 4 in number) lived according to the primitive rule. After a time the number was increased to 13, and T. herself took up her abode with them, spending, as she says, the 5 happiest years of her life. Her energy and administrative ability were exceptional; between 1562 and her death she founded 15 new houses directly, and 17 through others. With the help of St John of the Cross (q.v.) she estab. her reform among the Carmelite friars. It is estimated that her work did much to prevent the spread of Protestantism to Spain. It inspired the leaders of the Counter-Reformation (q.v.) all over Europe. She combined practical common sense and industry with extraordinary mystical graces, which are described in her writings. These latter are among the classics of Sp. literature and masterpieces of mystical theology. T. was canonised in 1622. Her feast is on 15 Oct. Her works include *The Way of Perfection*, *The Castle of the Soul*, and *The*

Book of the Foundations, all of which have been trans. into Eng. by E. A. Peers, 1946. See lives by G. Cunningham-Graham, 1894; H. Waack, 1947. See also Victoria Sackville-West, *The Eagle and the Dove*, 1943.

Teresina, Brazil, cap. of Piauí state, in a cotton, sugar, rice, and cattle area. Pop. 69,000.

Tergite, see TRIESTE.

Ter-Gouw, see GOUDA.

Tergoviste, see TIRGOVISTE.

Terhune, Albert Payson (1872-1942). Amer. writer of animal stories, b. Newark, New Jersey. Educ. at Columbia Univ.; he travelled in Egypt and Syria, and wrote *Syria from the Saddle*, 1896. Back in America, he became a journalist, but from 1919 concentrated on writing about dogs. *Lad: a Dog*, 1919, had a sequel, *Further Adventures of Lad*, 1922. Other books are *Bruce*, 1920, *Buff, a Collie*, 1921, *His Dog*, 1922, *Wolf*, 1924, *The Heart of a Dog*, 1925, *Bumps*, 1927, *A Dog Named Chips*, 1931, *The Way of a Dog*, 1934, and *A Book of Famous Dogs*, 1937. *Now That I'm Fifty*, 1925, and *To the Best of My Memory*, 1930, are autobiographical.

Terminable Annuities, see PUBLIC DEBT.

Terminal Velocity. If a body moves under the influence of a continuous force in a resisting medium, the resistance being some function of the velocity of the body, there is a limit to the velocity that it can attain. This limit is known as the T. V., and is the velocity to which that of a body falling through the atmosphere continually tends. The T. V. is small for snowflakes, greater for drops of rain, and greater still for hailstones, and it depends largely on the size, shape, and density of the falling body.

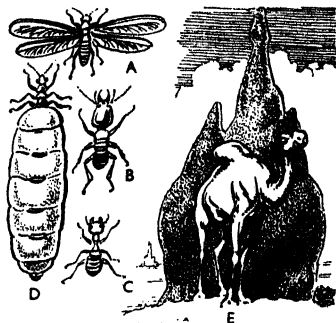
Terminator, the line which divides the dark from the illuminated portion of the disk of the moon or of a planet.

Termini Imerese (anc. *Thermae Himerenses*), fishing port and tourist resort in Sicily, on the N. coast, 19 m. SE. of Palermo (q.v.). In the higher part of the tn is a beautiful 16th-cent. cathedral, and parts of the anc. city walls remain. The Gk city of Himera (founded 648 bc) was razed in 408 bc by the Carthaginians, who built a new tn on the opposite bank of the riv. From a warm medicinal spring in its neighbourhood came to be called *Thermae Himerenses*. It was the birth-place (361) of Agathocles, tyrant of Syracuse from 317 to 289 bc. There are remnants of Rom. buildings, including a theatre. Hot mineral springs are found in the vicinity. The tn has a trade in agric. produce, olive oil, and fish. Pop. 24,800.

Terminus, Rom. god of boundaries and frontiers. His cult was supposed to have been introduced by Numa, who made everyone mark the boundaries of his land with stones consecrated to Jupiter, and offer yearly sacrifices at these stones. This festival was the Terminalia, celebrated on 23 Feb.

Termites, order of insects, Isoptera, characterised by the possession of biting

jaws and by the absence of a metamorphosis. T. are the only insects other than those belonging to the Hymenoptera which are known to exist in organised communities. In their habits they resemble ants in many respects, and are often called 'white ants,' though structurally they differ from ants very considerably, while their communities are differently composed. The communities consist of 'kings' and 'queens,' which are fertile males and females that have cast their wings by a rupture at a transverse suture close to the root, and of infertile males and females whose wings never develop, and who become 'soldiers' or 'workers' according to the nature of their food. The head is large, and though many forms are blind, others have compound and simple eyes. The 'soldiers'



TERMITES

A, male; B, soldier; C, worker; D, female distended with eggs; E, 'nest.'

are provided with especially large heads and powerful mandibles. The queen's abdomen becomes enormously swollen, her ovaries producing eggs at the rate of about 1 per sec. She and the king are usually confined in the central cell in the nest, and in case of disaster to them, nymphs are always in readiness to take their places, after stimulation of their reproductive organs by special feeding. T. are confined to the tropical and warmer temperate regions, but some occur in S. Europe even, recently, in N. Germany. They feed on wood and waste substances, and construct earthen tunnels and galleries, cementing the walls of their runs with their excrement, which hardens like brick. Some of the tropical species raise vast earthen nests as much as 20 ft. high. They are very destructive, especially of woodwork and of wood foundations of buildings. Wood treated with creosote is immune, and wood that has been attacked may be cleared by fumigation.

Termonde, see DENDERMONDE.

Terms: 1. In law the limitation of an estate or the whole time or duration of an estate, as a lease for the T. of 21 years, for

the T. of 3 lives, etc. See also LIMITATION OF ESTATES; SHELLEY'S CASE, RULE IN; VENDORS AND PURCHASERS.

2. The law T. or portions of the year during which the high court sits. They are 4 in number, viz. Hilary, which usually begins about 11 Jan. and ends about the end of Mar.; Easter, which begins in the early part of April and ends in the middle of May; Trinity, which begins towards the end of May and ends towards the end of July; and Michaelmas, which begins in the first week in Oct. and ends just before Christmas. The 'Inns of Court' T., called by the same names as the above, are the 'dining terms' for students, who in the process of qualifying for call to the Bar fulfil the notion of residence that obtains in colleges or other places conferring degrees, by eating dinners during term time.

3. In univ. and colleges the time during which instruction is regularly given to students. Schools have adopted the same system. In the U.K. there are usually 3 T. The academic year starts in Sept./Oct., and there are breaks at Christmas, Easter, and during the summer months.

4. In formal logic, the expression in language of the notion obtained in an act of apprehension. T. are divided into simple, singular, universal, common, univocal, equivocal, abstract, concrete, etc. See also SYLLOGISM.

5. In algebra, a member of a compound quantity, as a , in $a + b$; or ab , in $ab + cd$.

Tern, riv. of Shropshire, England, which joins the Severn at Atcham. Length 32 m.

Tern, or Sea Swallow (*Sterna*), genus of birds resembling the gulls, to which they are allied, but smaller and slenderly built and with a forked tail. They are extensively distributed, especially in temperate climates. Though poor walkers and swimmers, they are very active on the wing, skimming the surface of the sea from sunrise to sunset in search of small fish and other marine animals. A number of species occur in Britain, the commonest of which is *S. hirundo*, with grey plumage. The others are the sooty T. (*S. fuscata*), the Arctic T. (*S. macrura*), the Sandwich T. (*Thalasseus sandwicensis*). The Arctic T. is remarkable for the range of its migration, from Greenland, N. America, and N. Europe as far S. as the Antarctic. The black T. and other similar species known as marsh T.s are now placed in the genus *Chlidonias*. They are distinguished by their shorter bills, short and slightly forked tails, and less fully webbed feet.

Ternate, tn and is. in the Malay Archipelago, one of the Molucca Is., Indonesia. Of volcanic origin, its mts rise to 5627 ft, and it is densely wooded. Area 41 sq. m.; pop. (1945) 13,000; (1950) 7000. Exports are timber, copra, and spices. T. was discovered by the Portuguese in 1522, but was under Dutch sovereignty by 1683. Occupied by the Japanese in the Second World War, it became part of Indonesia in 1950.

Terneuzen, seaport in the prov. of Zeeland, Netherlands, situated on an arm

of the Scheldt, 28 m. WNW. of Antwerp. It is at the end of the 20½ m. long Ghent-T. canal. Pop. 14,670.

Terni: 1. Prov. of Italy, in S. Umbria (q.v.). It is in the Apennines (q.v.), and consists of 3 mt blocks, separated by the broad valleys of the Tiber (q.v.), Paglia, and Nera. The prin. tns include T. and Orvieto (qq.v.). Area 836 sq. m.; pop. 226,000.

2. (Anct. Interamna Nahars or Interamna Umbra), It. tn, cap. of the prov. of T., 40 m. SSE. of Perugia (q.v.). Its site is believed to have been occupied since 1000 BC, and the tn has Rom. remains and early Christian tombs. The cathedral (13th-17th cents.) has a 10th-cent. crypt. There was severe damage during the Second World War. T. has important steelworks and iron foundries, as well as chemical, engineering, and textile industries, and lignite deposits. It is thought to have been the bp. of Tacitus (q.v.). Pop. 84,600.

Ternopol' (Ukrainian Ternopil', Polish Tarnopol): 1. Oblast in Galicia (W. Ukraine), on the Volhynia-Podolia upland N. of the R. Dniester, in the Black Earth belt. There are lignite and peat deposits. Wheat, sugar beet, and sunflowers are grown, and cattle and hogs raised; there are varied food industries. For hist. see GALICIA. Area 5,300 sq. m.; pop. (1956) 1,090,000, mostly Ukrainians, also Jews (before 1946 also Poles).

2. Cap. of the above, 78 m. SE. of L'vov. It is a major railway junction (5 lines), with some industry. Founded in 1540 as a fortress, it became an important trading centre; it has been prov. cap. since 1921. Fierce fighting took place here in 1944. Pop. (1956) 32,000 (1940, 46,000), before the war half Jewish.

Terpander (7th cent. BC), Gk musician and poet, b. Antina in Lesbos. He has been described as the father of Gk lyric poetry, but no genuine fragment of his work survives.

Terpenes, general name given to hydrocarbons which occur in essential oils, having a molecular formula $(C_5H_8)_n$. They can be classified as mono-T.s ($n = 2$, e.g. *p*-cymene), sesqui-T.s ($n = 3$), di-T.s ($n = 4$), and tri-T.s ($n = 6$). They are all volatile and unsaturated compounds, the most important being limonene, camphene, and pinene (q.v.), many of them being derivatives of *p*-cymene (*p*-methyl isopropyl benzene). There are also derivatives of T.s such as alcohols (e.g. terpineol, menthol), Terpene ketones (e.g. carvone, camphors, menthone), Terpene ethers (e.g. cineole), and acyclic members (e.g. geraniol, citral, and myrcene).

Terpsichore (Gk 'delighting in the dance'), goddess of song and dance. See MUSES.

Terra, or Tellus, see GAEA.

Terra Australis Incognita, vast unknown continent which was commonly believed to lie beyond the ocean of the S. hemisphere as a counterpart to the land masses of Europe, Asia, and Africa. The belief was held by the geographers of antiquity and the Middle Ages and was only finally

exploded by Capt. James Cook in the late 18th cent. T. A. I. was believed to stretch in a solid mass as far N. as Tierra del Fuego as late as the 16th cent. Discoveries by Magellan, Drake, Torres, Tasman, and other explorers gradually brought about a realisation that this supposed land mass did not exist; finally, Cook ascertained the limits of Australia and of the Antarctic continent and proved the original theory entirely false.

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Terra Cotta (It. 'baked earth'; Lat. *terra cotta*), hard, unglazed pottery fabric, used for bricks, tiles, and architectural ornaments, as well as for tombs and coffins, vases, and statues. It may be left with its natural brownish red surface unglazed and uncoloured, or it may be painted as was customary among the Greeks, or it may be covered with enamel.

See It. A. Higgins, *Catalogue of Terracottas* (British Museum), vol. 1, 1954.

Terra di Lavoro, see CASERTA.

Terra Japonica, see CATECHU.

Terra Sigillata, see SAMIAN WARE.

Terraces, in geology, are horizontal shelves or benches on hillsides or on sloping ground. Riv. T. occur wherever the valley has been sufficiently widened and graded to allow formation of flood-plain. On reduction of the level of the flood-plain, the portions resting on the valley slopes are left as ledges, and indicate the various steps in the processes of erosion and oscillations in sea-level. Smaller T. are formed in higher courses of rivs. by the washing up of material forming the banks; they are not level, but have a slight gradient towards the riv. See also BEACHES, RAISED.

Terracina, or **Tarracina**, It. tn, in Lazio (q.v.), on the Tyrrhenian Sea, 23 m. SE. of Latina (q.v.). Originally a tn of the Volsci (q.v.), under the name of Anxur (q.v.), it became in time a Rom. colony. The cathedral (11th-17th cents.) stands on the site of an anct temple; a Rom. aqueduct remains, and overlooking the tn is a ruined temple of Jove. There was much damage during the Second World War. The tn has a trade in agric. pro-

duce, and the muscatel wine of the region is well known. Pop. (tn.) 21,900; (com.) 26,400.

Terramare (from It. *terra*, earth, and *marna*, marl), natural fertiliser found in the valley of the R. Po, Italy, in flat-topped mounds which were vils. of peoples of a Bronze Age culture. The settlements, which were built on pile foundations but which were nevertheless on land, have taken generally the name of the fertiliser. See C. F. C. Hawkes, *The Prehistoric Foundations of Europe*, 1940.

Terramycin, see ANTIBIOTICS.

Terranova di Sicilia, see GELA.

Terrapin, name given to various tortoises of the families Testudinidae and Dermatemnydidae some of which, especially *Malacoclemmys terrapin*, found in the salt marshes on the E. shores of N. America, are highly valued as food. Among the most important are the yellow-bellied, the red-bellied, the chicken, and the salt-water T.s. They are all active swimmers, their clawed digits being united by a web. They are almost omnivorous, but feed chiefly on aquatic animals. In America and Australia they are commonly kept and fattened in captivity. See also TORTOISE.

Terre Adélie, Fr. sector of the antarctic mainland between longs. 136° and 142° E., administratively part of the *Terres australes et antarctiques françaises* (q.v.) since 1955. It was first visited by Dumont d'Urville (q.v.) in 1840, Charles Wilkes (q.v.) landing on the same coast in the same year. Fr. expeditions, *Expéditions Polaires Françaises*, led by P.-E. Victor (q.v.) have explored and mapped much unknown land since 1948. See M. Marret, *Antarctic Venture*, 1955.

Terre Haute, city, co. seat of Vigo co., Indiana, U.S.A., on Wabash R. 68 m. WSW. of Indianapolis in an agric. and coal-mining region with clay pits. It manufs. bricks, tiles, chemicals, metal products, glass, etc. It has a state teachers' college and the Rose Polytechnic Institute. Pop. 64,200.

Terre-Neuve, see NEWFOUNDLAND.

Terrell, city of Kaufman co., Texas, U.S.A. Cotton is the chief manuf. Pop. 11,500.

Terres Australes et Antarctiques Françaises, Fr. antarctic possessions, estab. by law No. 55-1052 and previously administered (since 1924) as dependencies of Madagascar (q.v.). They consist of Ile St Paul, Ile Amsterdam, Iles Crozet, Iles de Kerguelen, and Terre Adélie (q.v.). See *Polar Record*, Vol. 8, No. 52, 1956, p. 62-3.

Terrestrial Magnetism, see GEOMAGNETISM; MAGNETISM, *Terrestrial magnetism*.

Terrier, term originally applied to dogs which pursue rabbits and other game into their burrows. The Kennel Club lists the following as true T.s.: Airedale, Australian, Bedlington, Border, Bull, Cairn, Dandie Dinmont, Fox, Irish, Kerry Blue, Lakeland, Manchester, Norwich, Scottish, Sealyham, Skye, Staffordshire Bull, Welsh, and West Highland White. But the word is also now applied to a number of breeds, many of which are too large and some too

pampered to justify the name; these include Boston T.s. The true T. is a particularly intelligent dog. See separate articles.

Terrier, Old English, or White, old terrier breed, which after the Kennel Club's abolition of cropping became very rare, in spite of the fact that it is the only Eng. terrier so called. The head should be long, narrow, and flat, with a sharp tapering muzzle, muscular jaw, pronounced stop, and black nose. The eyes should be small and black, set fairly close together; the ears, formerly prick, should be round and flat. The rather long neck should be muscular; the forelegs straight, and the thighs comparatively large and muscular. The whelp tail should be carried low. The coat must be close, hard, short, and glossy, and pure white—colours such as blue not being favoured. The ideal weight is between 10 and 15 lb.

Terriss, William (1847-97), actor, b. London, his real name being Wm Charles James Lewin. He was educ. privately. He tried sev. careers, but went on the provincial stage in 1867, and soon came to London. His best parts were Squire Thornhill in *Olivia* and William in *Black-eyed Susan*. He was very popular as a hero of melodrama, playing for years at the Adelphi Theatre, at the stage door of which he was assassinated by a mad and obscure unsuccessful actor.

Territorial Army. History. When the Brit. infantry was territorialised under Lord Cardwell's scheme of 1881, volunteer rifle corps were linked with regular and militia units to form the regimental dist. For this reason most T. A. infantry units now bear the title of a line regiment (e.g. Green Howards) with a battalion number 4 or above. There are exceptions to this, of the following order: "expatriate" units with titles like London Scottish; battalions from cos. which do not support a regular regiment, such as Hertfordshire and Monmouthshire; numerous London Light Infantry units with roots in the 1859 Volunteer Movement such as the Artists' Rifles, Queen's Westminster, etc.; and the unique Honourable Artillery Company, which was formed before the regular regiments existed; nevertheless, every T. A. unit is affiliated to some regular unit whether it shares its name or not. Under the Cardwell scheme this affiliation meant little in practice, but after the passing of the Territorial and Reserve Forces Act of 1907 and Lord Haldane's administration of it, liaison between regular and T. A. units became a reality. Under this Act co. associations were formed which raised and administered (but did not command) the new territorial force. These associations still function.

The territorial force was intended at first for home service only, but provision was made for individuals to volunteer for overseas service. In 1914 so many of the 11,900 officers and 302,000 other ranks did so volunteer that war units were mobilised in their entirety and brigaded in the 15 territorial (and yeomanry) divs., which took part in the First World War (see

table below). The 14 mounted brigades which completed the force up to 1914 were not employed as such, but the 53 regiments of which they were composed went to reinforce other armies or to form the 74th Div., where units came from all parts of the U.K. The other 14 divs. were at first known only by their regimental designation, and the now well-known numbers were not allotted until May 1915; the regimental titles are shown in the first column of the table at the end of this section.

Up to 1914 the defence forces by land consisted of: first line, regular army; second line, special reserve; third line, territorial force. In 1920 a reorganisation promoted the territorial from third to second line and renamed them the T. A.; the special reserve reverted to its old name of militia (q.v.), but in practice no militia was raised until 1938. The 1920 estab. provided for the same 14 infantry divs. (but only 2 brigades of cavalry), some army troops, and a coast defence and an anti-aircraft (A.A.) component. Now the obligation to serve overseas was placed on all members. A small proportion of the cavalry was mechanised. About 150,000 men were recruited, and numbers remained at about this figure until 1938. In 1935 a new estab. was drawn up and partly put into effect: 46 and 47 Divs. were disbanded and went to fill the ranks of 5 A.A. divs.; the field force was now to consist of 9 infantry, 3 motorised, and 1 armoured div. Now for the first time old promises were implemented: some brigades and a few divs. were commanded by T. A. officers, and the deputy director general was also a T. A. officer. In 1938

Regiment	Divisional Numbers	
	1914-18	1939-45
E. Lancs	42	42
Wessex	43 & 45	43 & 45
Home Counties	44	44 & 12
N. Midland	46	46 & 59
London (No. 2 area)	47	47
S. Midland	48	48 & 61
W. Riding	49	49
Northumberland	50	50
Scottish Highlands	51	51 & 15
Scottish Lowlands	52	52
Wales	53	53 & 38
E. Anglia	54	54 & 18
W. Lancs	55	55
London (No. 1 area)	56	56
All England	74 cavalry	—

numbers rose to 204,000, and between then and the outbreak of war almost doubled. But of these 405,000 some 107,000 belonged to air-defence units, so that approximately the same numbers were available for the field force as in 1918. During the war the T. A. ceased to exist as a separate force, and recruiting for it ceased. But the fusion of regular T. A. and conscript elements in the air-defence

force, which then retained only men of certain medical categories, had the effect of releasing enough fit men to form a further 7 divs. largely composed of territorials, for the field force (these divs. are shown second in the second column of the table).

As in 1920, so on 1 Jan. 1947, the T. A. was re-estab. There are besides the field force some independent brigades and a much higher proportion than heretofore of corps, army, and G.H.Q. troops, to be drawn principally from regions where the field force div. has been disbanded. National servicemen, on completion of full-time service with the regular army, up to 1957 undertook a further 31 years' part-time service in the T. A.; they were required by law to complete a total of 45 days' training with the T. A. during these 34 years. In 1956 a further reorganisation took place. Provision was made for 10 infantry divs, 2 being earmarked for N.A.T.O.

Pay and Conditions of Service. The permanent staff of T. A. units (adjutants, quartermasters, instructors, some unit commanders) is composed of regular officers and N.C.O.s. Officers of the T. A. must be British subjects, and promotion conditions follow much the same lines as for regular officers. 'Boys' (i.e. recruits under 18) are no longer listed. When in camp, territorials receive pay and allowance on the same rate as regulars. Travelling expenses from home to place of training are paid. All ranks receive a bounty if present on embodiment, and all except officers receive an ann. bounty (originally £3, now £12) on completing ann. training. The requirements of the latter vary from term to term, but amount generally to about 15 full days and some 50 drills of 2 hrs each.

Territorial Waters. Most modern states recognise the sovereignty of every other state over its own marginal waters. The limit is generally fixed at 1 marine league from the shore measured from low-water mark. This distance of permissible appropriation is the subject of much criticism by writers on international law, because it was in its origin suggested by the supposed range of a gun: the tremendous range of modern artillery has made the distance meaningless (see on this W. E. Hall, *International Law* (8th ed.), 1924). Three m. at low-water mark, however, remains the minimum claim to sovereign control of the high seas. A more extensive jurisdiction to the waters surrounding their coasts is claimed by some states, though this extended claim may be restricted to certain specific purposes. The acquittal for want of jurisdiction of a Ger. prisoner charged at the Central Criminal Court with manslaughter through the running down of the *Strathclyde* by the *Franconia* (in the famous trial of Reg. v. Keyn, 1876) 2 m. off Dover led to the passing of the Territorial Waters Jurisdiction Act, 1878. By that Act the Eng. courts have jurisdiction to arrest and try persons, whether Brit. subjects or not, for offences com-

mitted on the high seas within the T. W. of the Crown, i.e. within 1 marine league from the coast. A conference on the Law of the Sea at Geneva in 1958 failed to agree to the demand of Iceland and others that the limit of T. W. should be extended to 12 m. All attempts at a compromise solution proved abortive. See L. Oppenheim, *International Law* (vol. I, *Peace*, 6th ed.), 1947.

Terror. Reign of, see FRANCE: *History*.

Terry Family, Eng. actors and actresses. **Benjamin Terry** (1818-92) and his wife were well-known provincial actors, although in their later years they also had engagements in London with Maeready and Charles Kean. Their children were:

- (1) *Kate Terry* (1844-1924), the eldest of the family, made her first appearance on the stage in 1850, and the next year came to London and was engaged by Charles Kean. She appeared as Cordelia, Ophelia, Ariel, Juliet, Viola, all of which she played with remarkable success, but especially made a great hit in 1862 by her part of Mrs Union in *Friends or Foes*.
- (2) *Dame Ellen Alicia Terry* (q.v.) (1848-1928).
- (3) *Marion Terry* (1856-1930) won a great reputation as an actress, notably in *Lady Windermere's Fan*, in which she reappeared in 1911 at St James's Theatre.
- (4) *Florence Terry* (d. 1896) played in *The Iron Chest* with Irving, and was the original Little Nell of Halliday's play.
- (5) *Fred Terry* (1865-1933) first appeared on the stage in 1880 under the Baneroffe. Together with his wife, Julia Neilson (q.v.), he played in *Sweet Nell of Old Drury*, *Pympatia*, *As You Like It*, *The Scarlet Pimpernel*, *Henry of Navarre*, etc. His daughter *Phyllis Neilson-Terry* (b. 1892) became well known as a Shakespearian actress.



Topical Press

DAME ELLEN TERRY

Terry, Dame Ellen Alicia (1848-1928), actress, b. Coventry, daughter of Benjamin T., an actor. She made her first appearance on the stage as the boy Mamilius in *The Winter's Tale* in 1856 at the Princess's Theatre under the management of Charles Kean. In the same company she played Puck in *Midsummer*

Night's Dream and Arthur in *King John*. In 1863 she played in various companies in London, including the role of Beatrice in *Much Ado*. She married the painter George Frederick Watts, nearly 30 years her senior, in 1864, but they separated a year later. Ellen T. returned to the stage in 1866, at Queen's Theatre, Long Acre, where she first acted with Henry Irving. In 1875 she scored a great success as Portia in *The Merchant of Venice*, revived at the Prince of Wales's Theatre under the management of the Bancrofts. While in John Hare's company at the Royal Court Theatre, she married E. A. Wardell (Charles Kelly, d. 1885), and won great praise for her Olivia in Wills's *Vicar of Wakefield* in 1878. The same year she was engaged by Irving as leading lady at the Lyceum, where she acted constantly for 13 years, appearing as Ophelia, Portia, Desdemona, Juliet, Beatrice, Viola, Lady Macbeth, Katharine (*Henry VIII*), Cordelia, Imogen, and Volumnia (*Coriolanus*). She appeared with Mrs Kendal in Tree's revival, at His Majesty's, of *The Merry Wives of Windsor*, in 1902. Her stage jubilee was celebrated in 1906. In 1907 she married James Carew, an Amer. actor. Among her later parts were Cicely Waynflete in Shaw's *Captain Brassbound* and Alice in Barrie's *Alice Sit-by-the-Fire*. Ellen T. was one of England's greatest actresses. Her interpretation of Portia was famous throughout the Eng.-speaking world, and most critics agree that it has never been excelled. Her exquisite voice and skilful use of gesture were perhaps best seen in her Shakespearian performances. With Irving Ellen T. helped to raise the international reputation of Eng. acting; her interpretations played a considerable part in the success of the Shakespearian revival. Her influence, particularly in tragedy, has not decreased since her death. She received sev. honorary degrees, and in May 1922 the Grand Cross of the Order of the Brit. Empire. See her autobiography 1908; E. Gordon Craig, *Ellen Terry and her Secret Self*, 1930; E. Craig and C. St. John (eds.), *Ellen Terry's Memoirs*, 1932; C. St. John (ed.), *Ellen Terry and Bernard Shaw: a Correspondence*, 1931.

Terry, Sir Richard (Furman) (1865-1938), musicologist, b. Ellington, Northumberland. After various appointments he became organist and choir-master at Downside Abbey in 1896 and at Westminster Cathedral in 1901, where he remained until 1924. He did great work there accompanying the mass and divine office according to the highest musical standards and traditions, and he wrote on and ed. much church music. He also had a specialist's knowledge of sea shanties and carols. He was knighted in 1922.

Terschelling, one of the W. Frisian Is. (q.v.), Netherlands. It is 16 m. long and 3 m. wide. West T. is the chief vil. The inhab. are mainly engaged in fishing, and there is a considerable tourist trade. Pop. 3580.

Tertian Fever, see under MALARIA.

Tertiaries, see FRANCISCANS.

Tertiary, or **Cainozoic**, era of geological time extending from the close of the Cretaceous Period to the beginning of the Glacial Period; the same terms are used to denote the rocks formed during this era. T. strata are divided into 4 systems, the Eocene, Oligocene, Miocene, and Pliocene, the last being the youngest. During the T. era, great disturbances in the earth's crust led to the development of many present-day topographical features. The Alps, Himalaya, Atlas, and Cordilleras were largely formed in T. times. The volcanoes of the Andes, Iceland, and Japan were active then. During the deposition of the T. strata, older forms of life became extinct and were replaced by species of animals and plants closely related to those of the present day. The mammals and the flowering plants underwent great development. Near-human creatures capable of using tools probably first appeared towards the end of the era. In Britain T. strata occur mainly in the S. and E. of the country, but T. volcanoes existed in W. Scotland, the Hebrides and N. Ireland.

Tertis, Lionel (1876-), viola-player, b. W. Hartlepool. He studied music at Leipzig and in London. T. became a brilliant viola-player and a great teacher, and in addition has arranged much music for the viola.

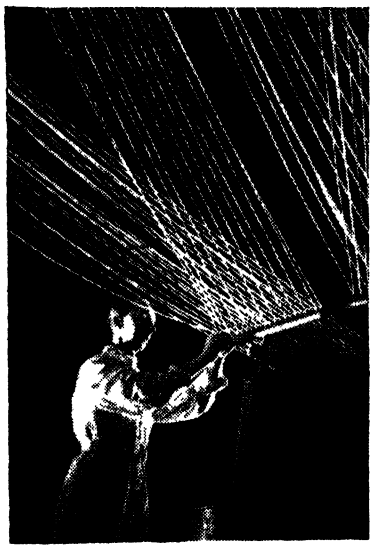
Tertullianus, Quintus Septimius Florens (c. 160-230), Christian apologist, b. probably at Carthage, attained to some eminence as an advocate or rhetorician. At Carthage, probably, he was converted to Christianity, c. 190, and at once ordained priest, where we are not told. He speaks of having been at Rome, and he could write Greek. About the end of the 2nd cent. he became a Montanist (q.v.), according to Jerome because of the envy and insults of the Rom. clergy, but a more adequate and probable reason lies in the character of T. himself. He was a rigorist and violently opposed the restoration to communion of penitent adulterers and fornicators condemned by Agrippinus, Bishop of Carthage. T. holds one of the first places among the Lat. fathers for learning and intellectual power. His writings are apologetic, practical, and doctrinal. The *Apology* written at Carthage, probably in the reign of Severus, contributed largely to the better understanding of Christianity and the mitigation of persecution. See *Vienna Corpus Scriptorum Ecclesiasticorum Latinorum*, vol. xx (1890); E. Leigh-Bennett, *Handbook of the Early Fathers*, 1920; R. E. Roberts, *The Theology of Tertullian*, 1924; J. Morgan, *The Importance of Tertullian in the Development of Christian Dogma*, 1928; T. Brand, *Tertullian's Ethik*, 1929; P. Galtier, *L'Eglise et la remission des péchés aux premiers siècles*, 1932; G. Bardy, 'Tertullien', *Dictionnaire de Théologie Catholique* (Vacant-Mangnot), 1946.

Teruel: 1. Sp. prov., in Aragon (q.v.). It is very mountainous, the highest point being in the Sierra de Jabalambre (8568 ft), and has sev. large rivs. including

the Guadalavir (q.v.), the Guadaloupe, and the Jiloca. The Tagus (q.v.) has its source on the border between T. and Cuenca. T. has deposits of iron and lignite, and produces cereals, fruit, oil, and wine. Area 3722 sq. m.; pop. 237,000.

2. (Anct Turba) Sp. tn, cap. of the prov. of T., on the Guadalavir. Portions of its anct walls remain, and the tn has a Gothic cathedral, badly restored, fine old houses, sev. *mudéjar* towers, and a 16th-cent. aqueduct. It was besieged and taken by the republicans during the Civil war of 1936-9, but was later recaptured by the insurgents. Pop. 19,450.

Terylene, a synthetic textile fibre formed by condensation polymerisation of terephthalic acid and ethylene glycol

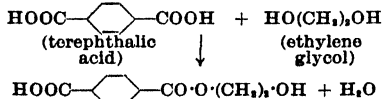


Imperial Chemical Industries

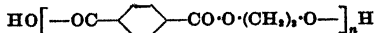
TERYLENE STAPLE FIBRE PRODUCTION,
WILTON

Individual tows of Terylene are brought together before entering the drawing and crimping machine.

(known to motorists as antifreeze). T. was discovered in the U.K. in 1941. Methyl terephthalate is preferred to the free acid, as the former is more easily purified.



This, on further condensation, gives the polymer T., viz.



The fibre melts at 245° C., is melt spun and cold drawn. It has a high tensile strength, but is more resistant to water and more inflammable than nylon (q.v.). It has a wide range of uses as a clothing fabric. In the U.S.A. it is called Dacron.

Terza Rima, It. metre consisting of sets of 3 lines, the middle line of each set rhyming with the first and last of the succeeding set. Dante's *Divina Commedia* is the most famous example. Wyatt was the first in England to use T. R. The form *aba, bcb, cdc* shows that it is continuous in movement; thus in Shelley's *Triumph of Life* the closing line of the stanza rarely coincides with the end of a sentence; and further instances may be found in Byron's *Prophecy of Dante*, though in his *Francesca of Rimini* he avoids the interlocking of stanzas, as does Browning in *The Statue and the Bust*.

Teschen, anct tn and duchy in Silesia (q.v.), on the Olza (Olsa). In 1625 it became an apanage of the Bohemian court, and in 1723 passed to Austria. In 1920 it was divided, along the line of the riv., between Poland and Czechoslovakia, forming 2 tns: Těšín (q.v.) in Czechoslovakia, and Cieszyn (q.v.) in Poland. In 1938, after the Munich Pact (q.v.), Poland seized Těšín; but it was restored to Czechoslovakia in 1945, the Polish inhab. being given certain privileges.

Tesho, or Tashi Lama, see LAMAISM.

Těšín, or Český Těšín, Czechoslovak tn in the region of Ostrava (q.v.). It is divided by the R. Olza (Olsa) from the Polish tn of Cieszyn (q.v.) with which it once formed 1 tn (see TESCHEN). It is in a coal-mining dist. and has textile manufs. Pop. 12,100.

Tesla, Nikola (1856-1943), Amer electrician and inventor, b. Smiljan, Croatia. He emigrated to America in 1882. He worked for some time with Edison, and is chiefly noted for the T. coil; this is of low self-induction, but produces a rapid alternating oscillatory current capable of long-distance transmission. It induces luminosity in a T. tube placed near. The currents have been experimented with for the cure of lupus. From 1903 he was chiefly engaged in developing telegraphy and telephony, and on plant for transmission of power from Niagara. He was awarded the Edison medal in 1917. See J. J. O'Neill, *Prodigal Genius*, 1945.

Teso, **Iteso**, or **Ileso**, a Nilo-Hamitic people of Uganda, now settled in the low country N. of Lake Kioga. They grow much cotton and number 400,000, the second largest tribe of Uganda. See J. Lawrance, *The Iteso*, 1957.

Tessedik, **Sámuel**, see SZARVAS.

Tessenderloo, tn in the prov. of Limbourg, Belgium, 15 m. NW. of Hasselt. It is the seat of an important chemical industry. Pop. 8800.

Tessera-ae, small cubes of natural stone, pottery, marble, or glass used in the

construction of mosaic floors. The Rom. mosaics were especially notable.

Tessin, see TICINO.

Test, riv. of Hants, England, rising near Ashe. Stockbridge and Romsey are the largest places on its banks. It enters Southampton Water. Length 30 m.

Test Act. By the T. A. 1673, all office-holders of the Crown, civil and military, were obliged within 6 months after appointment to make a declaration against transubstantiation, take the sacrament in accordance with the ceremony of the Church of England, and take the oath of supremacy. This Act was usually conjoined with the Corporation Act, 1661, which compelled all holders of municipal offices to take the sacrament, a provision aimed at both Presbyterians and Rom. Catholics. Lord John Russell in 1828 carried a motion for their repeal, but both had by then in fact been ineffective for sev. years.

Test Matches, see CRICKET.

Test-papers, paper slips impregnated with some chemical reagent. Litmus papers are used for testing for acids and alkalis, acids turning the blue variety to a red colour, and alkalis turning the red papers to a blue. Paper containing lead acetate is used as a test for hydrogen sulphide, which turns it brown. Oxidising agents, such as chlorine, ozone, etc., are tested for with papers containing potassium iodide and starch, which are turned blue by their presence. Turmeric paper, yellow in colour, is used as a test for alkalis and boric acid, which cause it to become brown.

Testament, see BIBLE.

Testament, see WILLS AND TESTAMENTS; COVENANT.

Testamentum Domini, produced probably in Asia Minor between 350 and 550. Based on the *Apostolic Tradition* of Hippolytus (q.v.), it was cherished by the Monophysite Churches. See J. Cooper and A. J. Maclean, *The Testament of our Lord*, 1902.

Testes, **Testicles**, or (in the U.S.A.) **Spermaries**, reproductive organs (gonads) of the male animal, in which are manufactured the reproductive cells (spermatozoa or sperms) whereby the eggs are fertilised. There is usually a single pair of T. in each individual.

Testimony, see DECLARATIONS OF DECEASED PERSONS.

Testing Clause, in Scots law, technical name for the clause in written deed or other formal legal instrument which authenticates the document according to the forms of law. It contains a record of the number of folios of which the document consists, the names and designations of the witnesses to the writer's signature, and the date and place of execution.

Testing of Metal, see METAL TESTING.

Testudo, see TORTOISE.

Testudo (Latin 'tortoise'), technical name applied to a Rom. military formation used when attacking fortified positions. The soldiers raised their shields well above their heads and interlocked them to form a protective covering.

Tetanus, or **Lockjaw** (from Gk *tetainō*, to stretch), infectious disease characterised by violent muscular contractions. The cause of the disease is the introduction into a wound of the *Clostridium tetani*. The existence of this micro-organism was demonstrated by Nicolaier in 1885, but a pure culture of it was first obtained by the Jap. scientist, Kitasato, in 1889. The germs are not themselves carried away in the blood-stream, but they set free toxins of poisons of unparalleled virulence, which of a drop of a cultivated example having been known to kill a mouse. The toxin acts upon the cells of the central nervous system causing uncontrollable tonic spasm of the voluntary muscles. The bacillus of T. forms resistant spores which are found in soil, animal excrement, etc., and it obtains an entrance to the body through a wound which has become contaminated with dirt. The disease is particularly prevalent in agricultural districts where heavy manuring of the ground is carried out. There is no truth in the supposition that wounds in the thumb are particularly liable to set up T. The duty of cleaning a wound which has come into contact with soil should never be neglected, as the development of the injurious toxin proceeds with fatal rapidity. The first sign of the disease is a feeling of stiffness at the back of the neck and difficulty in swallowing; the muscles of the jaw are then affected, with the result that the mouth is opened with difficulty, and afterwards becomes closely shut. The stiffening of the muscles proceeds to the body and limbs, until parts of the body become absolutely rigid to the touch. Besides the constant rigidity, there occur convulsions at intervals which may be as short as 10 min. The muscles are then contracted with such violence that they may become ruptured or lead to the fracture of a bone. The absence of complete relaxation serves to distinguish lockjaw from the spasms associated with strychnine poisoning. The treatment of T. should commence with an effort to make the wound surgically clean. T. antitoxin has been found life saving in treatment, and is given as a routine in cases with contaminated wounds, but when a patient has been demonstrably attacked the development of the toxin has usually proceeded too far for any injection treatment to be of avail. Curare ('arrow poison') and other relaxant drugs are now given to relieve the spasms of the muscles. T. is much more likely to be fatal if it occurs soon after a wound than if its onset is delayed. Thus an onset within a week of wounding gave a death rate of 60 per cent, whereas when the onset was delayed to 36 days the rate was only 15 per cent. Immunisation against T. is now possible by means of neutralised toxin (a toxoid) on the same lines as immunisation against diphtheria. Use of T. toxoid as a prophylactic during the Second World War was highly successful and no cases of T. occurred in those who had received routine inoculation.

Tetanus (in horses), see HORSE (DISEASES).

Tetany. The syndrome to which this name is given is characterised by localised neuro-muscular irritability, manifesting itself, in typical cases, as a carpopedal spasm, i.e. a tonic spasm of the hands and feet, in which the hands assume the so-called accoucheur position (fingers and thumb approximated), the arms are held close to the body, the knees are flexed, and the feet are in the equinovarus position. In severe cases all the muscles of the body may be affected. It is frequently associated with *laryngismus stridulus*. It may result from (a) disease or damage to the parathyroids (the latter may occur in very radical operations on the thyroid); (b) disturbances of calcium metabolism; (c) alkalosis (e.g. following over-administration of alkalis in cases of peptic ulcer); (d) hypervolaemia, either voluntary, hysterical or after exercise. In children it usually occurs in association with rickets, when the deficient absorption of calcium is due to lack of vitamin D. It may occur in cases of pyloric stenosis with vomiting, chronic diarrhoea, chronic interstitial nephritis, high intestinal obstruction, and in certain cases of poisoning, e.g. by arsenic, lead, chloroform, and morphine. Treatment, which should include that of the associated condition, consists of administration of parathormone and calcium, either by the mouth or intramuscular or intravenous injection.

Tetbury, mkt tn and par. of Gloucestershire, England, 10 m. SW. of Cirencester, and 8 m. from Stroud, on the W. region of the Brit. Railways. It is a centre of the agric. trade. Pop. (rural dist.) 6700.

Tete, an important trading centre on the banks of the Zambezi, founded by Portuguese in 1531, on the main road between S. Rhodesia and Nyasaland. The Zambezi is crossed by ferry. Large coal deposits have been found in this area, and a small quantity of alluvial gold is obtained.

Tethys, daughter of Uranus and Gaea, and wife of Oceanus, by whom she was the mother of the Oceanides and the riv. gods. She was also the teacher of Hera.

Tethys, one of the satellites of Saturn (q.v.). Mean distance from the centre of Saturn is 183,200 m. Its periodic time is 1 day, 21 hrs, 18 min. Stellar magnitude at mean opposition distance, 10.6.

Tethys Sea, a name given by geologists to a great trough-like ocean which throughout most of the Palaeozoic and Mesozoic eras extended in a general E.-W. direction over the sites of the present Alpine and Himalayan mts. The floor of this ocean or geosyncline was covered by great thicknesses of sediment which were finally forced up above sea-level into long ridges. From these ridges, the present-day mt chains were carved by the forces of erosion. The Mediterranean Sea is a greatly shrunken relic of the Tethys.

Tetiaroa, one of the Society Is., formerly owned by the Tahitian royal family. 26 m. N. of Tahiti, it is an uninhabited atoll, visited by labourers for copra-making.

Tetraethyl lead (T.E.L.), $\text{Pb}(\text{C}_2\text{H}_5)_4$, was first made in 1850, but only in recent years has it been utilised as an anti-knock constituent of motor fuels, a very small percentage of the compound being enough to allow greater compression without the disadvantage of self-ignition. It is manufactured by heating an alloy of lead and sodium with ethyl chloride in a closed vessel at 80-80°C. It is a poisonous liquid, immiscible with water. For use as an anti-knock it is mixed with ethylene dibromide, which carries off the lead in the exhaust gases.

Tetragrammaton, see JEHOVAH.

Tetrahedron, see POLYHEDRON.

Tetrao, see BLACKCOCK; CAPERCAILLIE; GROUSE.

Tetrarch, ruler over the fourth part of a country. The term was borrowed by the Romans from the Greeks, with whom, however, it had quite a different meaning. On the death of Herod the Great, his dominions were divided among Archelaus, Herod Antipas, and Herod Philip. Part remained under the direct rule of a Rom. procurator.

Tetrazzini, Luisa (1871-1940). It. soprano, b. Florence. She studied with her sister Eva, and with Ceccherini at the Florence Liceo Musicale. She made her first appearance at Florence in 1895. Later she toured Europe, Mexico, and S. America. She appeared in London at Covent Garden in 1907, as Violetta in *La Traviata*. Her brilliant coloratura fitted parts calling for that kind of skill, and she achieved particular successes in the title-part of *Lucia di Lammermoor*, and as Anna in *La Sonnambula*. In 1921 she pub. her reminiscences, *My Life of Song*.

Tetricus, Caius Esuvius, last of the pretenders who ruled Gaul during its separation from the empire. He reigned from A.D. 270 to 274, when he was defeated by Aurelian at Chalons.

Tetridodipyrol, see IODOLE.

Tetryl, powerful explosive, formula $\text{C}_7\text{H}_5\text{O}_6\text{N}_3$; melting point 129.1°C. It is obtained by nitrating pure dimethylaniline with nitric and sulphuric acids and washing and crystallising from acetone. It burns smoothly, it detonates violently on striking. It is also used as a booster. See EXPLOSIVES.

Tetschen, see DÉČIN.

Tettenhall, urban dist. of Staffordshire, England, 2 m. from Wolverhampton. Until 1950 a 'Royal Free Chapel', dating from about 975, was at T.; though partially destroyed by fire, it is now being restored. T. College is a Free Church school, incorporated in 1915. Pop. 10,000.

Tetuan, Duke of, see O'DONNELL, L. **Tetuan**, tn of Morocco, on the Mediterranean, 40 m. SE. by E. of Tangier, and a few m. S. of the strait of Gibraltar. The tn is surrounded by walls and includes a citadel. The chief industries are tile works and inlaying. T. was the H.Q. of the former Sp. Zone in Morocco. Pop. (1950) 80,732.

Tetzel, Johann (c. 1465-1519), Ger. Dominican friar, b. Leipzig. By the scandalous manner in which he carried on the

traffic in indulgences T. roused Luther to precipitate the Ger. Reformation in 1517. T. was later discredited and retired to a monastery. See life by F. Koerner, 1880; also G. Buchwald, *Unbekannte Predigten von Tetzels*, 1930.

Teucer, see TROY.

Teutoburger Wald, range of hills in Germany, on the N.E. borders of the *Land* of N. Rhine-Westphalia (q.v.), running NW. from Detmold (q.v.). It stretches for some 60 m. and is heavily wooded. The highest peak is Volmerstod (1520 ft). It is reputed to be the scene of the battle in which Arminius (q.v.) and the Ger. tribes defeated the Rom. legions under Quintilius Varus (AD 9). There are sev. spas. Coal, iron, and zinc are found.

Teutonic Knights, one of the great semi-religious orders of knights founded during the period of the crusades. It originated in a brotherhood formed by certain Ger. merchants of Bremen and Lübeck to alleviate the sufferings of the attacking troops during the siege of Acre in 1190. A hospital was started, and as a result the T. K. of the Hospital of St Mary of Jerusalem were founded. The new order, distinguished by a white mantle with a black cross, was formed on the model of the Knights Hospitallers (q.v.), and its members were also pledged to tend the sick, to protect the Church, and to wage war against the heathen. In 1198 the hospital was turned into an order of knighthood. The T. K. conquered Lithuania and the Baltic regions of Prussia during the 13th and 14th cents. For a cent. their H.Q. were at Acre (1191-1291), but the seat of the order was transferred to Marienburg in 1308. Their defeat at the hands of the Poles and Lithuanians at Tannenberg (1410) struck a great blow at their prestige and the order declined rapidly. It had already departed from its original moral standards. In 1525 the 'high master,' Albert of Brandenburg, apostatised from the Faith, and the order was secularised. It was suppressed by Napoleon in 1809.

Teutonic Languages, equivalent term for Germanic languages, see INDO-EUROPEAN LANGUAGES.

Teutons (Teutones), Ger. tribe, first mentioned by the Gk navigator Pytheas (q.v.), who encountered them on the Holstein coast. They migrated and wandered with the Cimbr (q.v.) 120-102 BC and, becoming a threat to N. Italy, were annihilated in battle by the consul Marius at Aix-en-Provence in 102 BC. The name T. later became a synonym for Germans.

Tevere, see TIBER.

Teverone, see ANIENE.

Teviot, riv. of Roxburghshire, Scotland, rising in the SW. of the co., and flowing NE. to join the Tweed at Kelso. It has good salmon and trout fishing. The valley it drains is called Teviotdale. Length 37 m.

Tew, Great, vil. of Oxon., England, 5 m. E. of Chipping Norton. Most of the houses, of mellow local stone, were built during the 17th cent., and G. T. is one of the earliest existing examples of a planned vil. The subsequent replanning of the

estate on landscape and ecological principles in the early 18th cent. suggests that it was carried out by John Loudon (q.v.). Pop. 340.

Tewkesbury, municipal bor. and mrkt tn in Gloucestershire, England. It is situated on the Avon, close to the point where that riv. joins the Severn, 10 m. NE. of Gloucester. The 'Bloody Meadow' on the S. side of the tn was the site of the fiercest combat of the battle of T., 4 May 1471, one of the bitterest battles of the Wars of the Roses, in which the Lancastrians were routed. T. was settled in Rom. times and in 1087 was a bor. and mrkt. Its most magnificent building is its abbey church, all that is left of a great Benedictine abbey, erected in the 12th cent. on a Saxon foundation. Monuments include the Beauchamp Chantry (1422) and the tomb of Hugh Despenser (d. 1349). Prince Edward, son of Henry VI. is reputed to be buried under the tower. T. has a 16th-cent. grammar school and sev. old timbered houses. In Tudor times it was famous for mustard making; now it is an agric. centre. Mrs Craik's *John Halifax, Gentleman* is set in T. Pop. 5446.

Texarkana, dual city of Bowie co., NE. Texas, and cap. of Miller co., NW. Arkansas, U.S.A., astride the state line near Red R. T. has 2 municipal govts. It is the rail centre, with shops, and a shipping, processing, manufacturing centre for a livestock, dairying, and agric. region (cotton). It manufs. lumber and wood products, caskets, fertiliser, feed, cottonseed oil, food products, refined sulphur and lead, and clothing. Pop. 40,628; 24,753 in Texas, 15,875 in Arkansas.

Texas, 'the Lone Star State,' the southernmost of the central states of the U.S.A. and the largest (263,644 sq. m.) in the Union, with a coast-line along the Gulf of Mexico, stretching for 370 m. from Mexico NE. to Louisiana. It is more than 3 times as large as Great Britain. Its extreme length is 760 m. and extreme breadth 620 m. It is separated from Mexico, on the SW., by the shifting Rio Grande; New Mexico and Mexico border it on the W., Oklahoma and New Mexico on the N., and Arkansas, Oklahoma, and Louisiana on the E. The general slope is NW. to SE. The 'Llano Estacado' is a barren plateau in the W., with a mean elevation of from 3000 to 5000 ft. The descent to 1000 ft is swift, and then come the fertile tracts of rolling prairie, with plentiful forests of yellow pine in the E., and with fat pastures alternating with rich corn lands—tracts which extend terracewise to the fertile lowlands and barren swamps of the coastal belt. Behind Padre Is., which hugs the shore for over 100 m. northward from the mouth of the Rio Grande to that of the Nueces, is a region of white sands, known as 'the desert.' With the exception of the Red and Canadian, which carry their waters eastward to the Mississippi, all the rivs., including the Brazos, Colorado, and Trinity, drain SE. to the Gulf of Mexico. T. is too large to enjoy a uniform climate and it has extremes ranging from tem-

perate to sub-tropical. The air in the W. is remarkable for its dryness. T. is one of the great granaries of the world, and one of the chief agric. states of the Union. Its agric. potentialities are indeed enormous, vast areas of available arable land not yet being under cultivation. Since 1930 the problem of soil erosion, from both wind and water, has been increasingly studied. In 1939 a Soil Erosion Act was passed. Since then about 150 soil-conservation dists. covering approximately 136,000,000 ac. have been estab. In 1939 nearly half the irrigable land in T. was irrigated. Results of such care include the 'Magic Valley' of the Lower Rio Grande, formerly almost desert, where citrus fruits and vegetables are now grown. T. leads all the states in value of agric. crops per annum. Maize, oats, wheat, and rice are important crops. Cotton is of great importance, T. producing about a seventh of the world's supply. Other agric. products are fruit (especially peaches, oranges, and grapefruit), potatoes, sweet potatoes, and other vegetables, peanuts, and sorghum. Much of T.'s farming is done by large-scale, highly mechanised, commercial farms, which now form a majority, though a large number of small farms still remain. Stock-raising is of vital importance, T. being one of the great cattle states. It raises over 20,000,000 head of live-stock, including cattle, swine, sheep, horses, and mules. Petroleum is the most valuable mineral product, representing nearly half the U.S. total output. The outputs of clay, coal, and Portland cement are also considerable. Lignite, sulphur, natural gas, quicksilver, and silver are also present and in the W. are great potash fields, as yet unexploited. It produces over 70 per cent of all the sulphur in the U.S.A. T. is the only source of helium in the country. Slaughter-houses and meat-packing stores, and after them flour and grist mills, are profitable industries. But lumbering and timbering, cotton mills, and the manuf. of cotton-seed oil and cake are very thriving, whilst iron founding and the making of machinery and cars as well as rice cleaning are making T. an increasingly industrial state, a process accelerated by the building of war plant and 'new tns' to house their workers during the Second World War. Much of the labour is done by Mexicans, some of the frontier tns having a pop. half Mexican.

Education is compulsory between 7 and 16 years of age. In 1948 increased educational provision was made for Negroes. There are 78 listed institutions for higher education, including 10 for Negroes. Chief religious bodies are the Rom. Catholic, S. Baptists, Methodists, and Negro Baptists. Segregation of white and coloured races is statutorily enforced. The state has good harbour facilities and has over 1000 m. of navigable waterways. There are over 17,000 m. of railways and over 27,000 m. of state highways. In 1950 T. had more than 600 airfields. The Houston Ship Canal, 57 m. long, connects Houston with the Gulf of Mexico, making that city the largest inland cotton mkt

in the world. Galveston is connected with the mainland by a causeway 2 m. long. The cap. is Austin, pop. 132,000, where the univ. of T. is situated. Other large cities are Houston, 598,000; Dallas, 434,500; San Antonio, 498,000; Fort Worth, 279,000; El Paso, 130,000; Corpus Christi, 108,300. Galveston has a pop. of 66,600. Increased industrialisation during the Second World War accounts for much of the large increase in T.'s city pops.

The Sp. explorers De Vaca and Coronado (qq.v.) were the first to explore the region now known as T. (the name was that of an Indian tribe), but the first permanent settlement was made by La Salle in 1685 at Fort Saint Louis. T. was surrendered by the French to the Spanish in 1713, who founded many religious missions. These contributed greatly to the conversion of T. not only to Christianity, but from a waste land into a civilised country. When Mexico revolted and became independent in 1821, Coahuila and T. formed 1 state. T. was colonised to a large extent by Americans and English, and when trouble broke out with the Mexican Gov., T. was constituted an independent rep. in 1836. In 1845 it sought and gained admission as a state of the U.S.A. After the Mexican War, which was precipitated by this admission, T. prospered. In 1861 it seceded with the S. states. The legislature consists of a Senate of 31 members and a House of Representatives of 150. Two senators and 21 representatives attend Congress. Pop. 7,711,194. See C. R. Wharton, *History of Texas*, 1935; R. N. Richardson, *Texas*, 1943; J. Frank Dobie, *A Vaquero of the Brush Country*, 1949.

Texas City, port of Texas, U.S.A., on the Bay of Galveston, 5 m. NW. of Galveston city. In 50 years it has grown from a hamlet into one of the U.S.A.'s largest ports, dealing with rather more trade than San Francisco. A severe explosion on a ship in T. C. harbour in 1947 killed over 600 people and destroyed much of the city. Pop. 16,600.

Texcoco (Tezcuco), anct cap. of the Aztecs in Mexico state on the central plateau of Mexico, with many archaeological remains in the dist. Woollens, glassware, and caustic soda are the modern manufs. Altitude 7400 ft. Pop. 5450.

Texel, the largest of the W. Frisian is., in the prov. of N. Holland, Netherlands, covering 71 sq. m. It is separated from the mainland by the 2-m.-broad Marsdiep and is reached by boat from Den Helder. At one time it was joined to the is. of Vlieland and the foreshore beyond. The N. part of the is. is called Eierland or Egg Land from the bird observatory erected in this part of the is., where thousands of birds belonging to more than a hundred species breed every year. Of late years the is. has been much frequented by tourists, and by holiday-makers as a camping centre. In 1945 it was liberated by the Russian prisoners-of-war who had been quartered there. The

whole is. forms 1 municipality; the inhab. live by sheep-breeding, agriculture, and fishing. There are considerable exports of lambs to England. T. ewe-cheese is famous as a Dutch export. The farmhouses on T. have a peculiarly square shape, with tall pyramidal roofs (*stolpen*). It was off T. in 1653 that an Eng. fleet under Monck beat a Dutch fleet under Tromp, who was killed during the battle. Pop. 10,400.

Textiles, see FABRICS, TEXTILE; CLOTH MANUFACTURE AND FINISHING; COTTON SPINNING AND MANUFACTURE; WOOL; RAYON; NYLON; MAN-MADE FIBRES.

Teyte, Maggie (1888-), soprano, b. Wolverhampton, studied in London and Paris, made her début at Monte Carlo in 1907 and then appeared at the Paris Opéra-Comique. In 1908 Debussy chose her to sing the heroine in his *Pelléas et Mélisande* at that theatre. In later years she excelled as an interpreter of songs, especially Fr.

Tezuco, see TEXOCO.

Tezuatlán, tn in the state of Puebla, Mexico. There is agric. production and processing, and copper is mined near by. Altitude 6600 ft. Pop. 8390.

Thackeray, William Makepeace (1811-1863), novelist and essayist, b. Calcutta. His father, Richmond T., was in the service of the E. India Company. He died in 1815, leaving his son an inheritance of nearly £20,000. T. was sent to England in 1817, and was educ. at Charterhouse, and at Trinity College, Cambridge, where he was a friend of Fitzgerald and Tennyson. He left the univ. after a year and travelled in Germany, staying chiefly at Weimar. In 1831 he entered the Middle Temple, but did not long pursue his legal studies. He spent much of the following year in Paris, and in 1833 became part owner of a weekly paper, the *National Standard*. The paper came to an end in the following year, when its losses were borne by T. The remainder of his patrimony disappeared with the failure of an Indian bank in 1833. He was at this time in Paris studying art. He now hoped to earn his living as an illustrator, and in April 1836 pub. *Flore et Zephyr—Ballet Mythologique*, a set of eight plates. In Aug. he married Isabella, Shawe, and shortly afterwards he became Paris correspondent of the daily newspaper, the *Constitutionnel*. This also failed, and in Mar. 1837 he returned to London, where his daughter Anne Isabella, later Lady Ritchie, the eldest of his 3 children, was born. To this period belong his contributions to *Fraser's Magazine*, including the *Yellowplush Correspondence*, 1837-8, and *Catherine*, 1839-40. From then onwards his life was permanently clouded by his wife's insanity. The *Paris Sketch Book* followed *Catherine* in 1840, but was unsuccessful. This was followed in 1841 by *Comic Tales and Sketches*, collected periodical writings, which revealed the two pseudonyms 'Yellowplush' and 'Michael Angelo Titmarsh' as the same person. In 1842 he visited Dublin, and *The Irish Sketch Book* appeared in 1843.

His friendship with Mrs Brookfield, begun in 1842, marked by a correspondence extending over many years, was one of the major influences of his life.

At this time recognition as a writer was slow in coming. *The Great Hoggarty Diamond* was refused by *Blackwood's Magazine* and appeared serially in *Fraser's*, 1841, as also did *Barry Lyndon* in 1844. This was one of his greatest works, excelling in irony and brilliant wit. Since 1842 he had contributed regularly to *Punch* and increased his reputation with *The Book of Snobs*, which appeared there, 1846-7. *Mrs Perkins' Ball*, 1846, a 'Christmas Book,' brought him further popularity, but he did not become really famous until the pub. of *Vanity Fair*, which was brought out in monthly parts from Jan. 1847 to July 1848. The first ed. in 1 vol. was pub. in 1848. Its success was slow at first. As soon as it was finished he began work on *Pendennis*, and the first of 24 monthly parts appeared in Nov. 1848. These 2 works placed him in the front rank of living novelists. In 1851 he resigned from the *Punch* staff in order to devote himself to the writing of *Esmond*, which was pub. in Oct. 1852. The same month he sailed to America, where he gained a great success with his lectures on *The English Humorists of the Eighteenth Century*, which had been delivered in London and the provs. the previous year. *The Newcomes* was pub. in monthly parts from Oct. 1853 to Aug. 1855. While it was coming out *The Rose and the Ring*, a delightful extravaganza, appeared (1854). In 1855 T. repeated his Amer. success, travelling widely and lecturing on *The Four Georges*. These lectures were also given in England and Scotland on his return from America in 1856. The following year he unsuccessfully contested Oxford in the Liberal interest. *The Virginians* came out in 1857-9, and in 1860 T. became first editor of the *Cornhill Magazine*, to which he contributed *Lovel the Widower*, 1860. *The Adventures of Philip*, 1861-2, and the delightful *Roundabout Papers*, 1860-3. He resigned the editorship in 1862. At the time of his death he was engaged upon *Denis Duval*, the fragment of which has been pub. (1864).

T. has been hailed by many critics as the lineal literary descendant of Henry Fielding (q.v.), and as only second to him as an Eng. novelist. In temper and style he had inherited much of the 18th-cent. literary tradition; but his work shows a blinding of many influences, and he really stands apart from any of the other great novelists of his own or the previous cent., though possessing characteristics of sev. His writing is finely seasoned with a highly developed wit and irony, as polished and sustained on occasion, as that of Swift or Pope, but without their bitterness, for T., though a realist, and disdainful of romantic tales, was a sentimentalist at heart, and could rival Dickens in the art of pathos. T.'s novels are all set on a grand scale, and the excellence of his characterisation and his pungent comments, given from a deep and

kindly knowledge of life, make up to a large extent for his indifferent plots (with the exception of *Esmond*, the plan of which was carefully prepared). Though, as his candidature for Parliament shows, T. was not indifferent to the political problems of the day, he did not write with the purpose of aiding specific social reforms or moral changes, called for by existing conditions, as Dickens and George Eliot did, and this probably accounts for his eclipse from popular favour in the early 20th cent. T. was, however, passionately interested in people as individuals, laughing at their foibles, and sympathising with the problems evolved by their particular traits of character. Such preoccupation with character needed a broad, spacious stage, untroubled by the diversions of the 19th-cent. Eng. scene, and so, frequently, T. turned almost unconsciously to the 18th cent. and the early years of the 19th, and on to this canvas stamped many qualities which could in fact come only from his own time, while in *Esmond* he immersed himself entirely in Marlborough's age, and produced one of the best historical novels in the Eng. language.

Collections of T.'s works include those by Lady Anne Ritchie (13 vols.), 1898-9. The ed. by Lewis Melville (20 vols.), 1901-7, is complete and has all the original illustrations. T. was one of the greatest of Eng. letter writers, and his *Letters and Private Papers* were ed. by G. N. Ray, in 4 vols., 1945. There is an important biography by Lewis Melville, 1899. See also A. Trollope, *Thackeray*, 1879; G. Saintsbury, *A Consideration of Thackeray*, 1931; M. Elvin, *Thackeray, a Personality*, 1932; J. W. Dodds, *Thackeray, a Critical Portrait*, 1941; L. Stevenson, *The Showman of Vanity Fair*, 1947; and G. N. Ray, *The Buried Life*, 1952.

Thaddaeus, see JUDAS.

Thailand (Siam), independent kingdom of the Indo-Chinese peninsula, bounded on the N. by Burma and Laos, on the E. by Laos and Cambodia, S. by the Gulf of Siam and W. by Burma. Lower T. extends down the Malay Peninsula, and is bounded by the Gulf of Siam on the E., the Brit. Malay States on the S., and the Bay of Bengal on the W. The total area of the country is 200,148 sq. m. (514,000 sq. kilometres). The peninsula slopes downwards to the ocean from the NW. and the great mt ranges of Tibet. The prin. rvs. are the Salween, which for 200 m. forms the boundary of Burma and T.; the Menam with its trib. the Meping, which are Thai throughout their length; and the Mekong, which forms most of the Laos boundary, and its tribs., which water the E. plains. The country is naturally divided into 3 regions: the NW. mountainous dist., the great central plain, which slopes down to the sea, and the narrow strip of lower T., which has some lofty mts and is covered with dense forest. The climate is not extreme; the plains are healthy, enjoying dry, fresh air and cool nights; but in the mountainous dists. the atmosphere is humid and malarial, and very trying to Euro-

peans. The flora resembles that of Burma: mangroves, rattans, and other palms flourish in the coast region; the great fertile plains are covered with rich rice fields and plantations of coconut and areca palm; farther up in the damp highlands great apple-trees grow by the side of peaches, vines, and raspberries. The teak-tree grows freely on the higher ground, and is much valued for its hard timber, which is floated down to Bangkok and exported; T. is the largest teak-producing country in the world. Sev. Brit. companies hold leases for the exploitation of the teak forests of North T. Pineapples, custard-apples, bread-fruit, and mango flourish freely. The country is rich in big game.

Products. The minerals include gold, silver, rubies, sapphires, tin, copper, iron, and coal. Tin mining is a flourishing industry, chiefly on the W. coast, especially on Phuket Is. Wolfram is also found. Rubies and sapphires are mined in the Chantabun dist. The forest dept is officered by experts from the Indian Forest Service, and forms a valuable industry. Rice is the chief crop, both for internal consumption and for export. Rubber-trees have been planted in Lower T. Large tracts of land formerly lying waste are being opened up by irrigation. Rice-mills and saw-mills and a few potteries and distilleries are all T. can boast of in the way of factories. Her commerce with India and China dates back to the beginning of the Christian era. Eighty-five per cent of the trade was with the Brit. Empire before 1939, and incomplete figures available suggested a considerable revival of commerce between T. and Britain from 1946 to 1949. The bulk of the country's trade is carried on through the two great ports of Singapore and Hong Kong, and the revenue in 1948 was estimated at £168,017,579. There are 2100 m. of state-owned railways, including a line connecting Bangkok with Singapore. Railways from the cap. run to Varinar (360 m. NE.), Chiangmai (460 m. N. of Bangkok), Aranya Prades (160 m. E.), and Padang Besar (618 m. S.), and there are sev. branch lines. There are internal air services and some 5000 m. of telegraph lines.

Government. The pop. is estimated at 20,277,000 (1955), of this the majority are Thai, and the remainder are Laos, Chinese, Malays, Cambodians, and Burmese. Until 1932 the king was an absolute monarch, but on 24 June of that year a *coup d'état* was carried out and the king was called upon to rule as a constitutional monarch. Under the constitution of 1932 supreme power resides in the nation, and the king, as head of the nation, exercises legislative power by and with the advice of the People's Assembly, and executive power through the State Council. The president and 14 members of this council are selected from the Assembly, which consists of 156 members, half of whom are elected and half nominated. The State Council is appointed by the king. For purposes of administration T. is divided into 70 provs., each under a commissioner who

is responsible to the minister of the interior.

Religion and Education. Buddhism is the prevailing religion of the country, and there are about 16,500 temples. Education, though now under national control, is mostly given through the temples. Primary education is compulsory and, in the local public and municipal schools, free. There are about 400 gov. schools, over 10,000 local schools under gov. inspection, and some 300 municipal schools. Girls now form some 31 per cent of the scholars. A univ. was opened at Bangkok in 1917. There are few tns with a pop. of over 10,000 people. Bangkok is the cap. of T., and other important tns are Chiang-Mai in the N. and Chumpton in

and T. began as early as 1680, and later hist. shows T. to form merely the buffer state between Fr. and Brit. possessions in the Far E. Eng. traders were in T. in the early part of the 17th cent., and later the E. India Company attacked some Thai through jealousy at the employment of Englishmen not in their service, which led to a massacre of Eng. at Mergui in 1687.

In 1855 a treaty was signed in which T. agreed to a Brit. consul in Bangkok, and Englishmen were allowed to own land and new trade facilities were granted. Similar treaties with other powers were arranged. Trouble arose about the Fr. and Brit. boundaries; the Thai and French fought out their difference of opinion on the ownership of sev. ports on



BANGKOK
National Assembly.

the S. The Thai call their country Muang-Thai, or land of the free.

History. It is difficult to trace the early hist. of the country, many influences from outside races having altered its civilisation. Little is known of its prehist., and all the more welcome is an account given by an allied prisoner who was forced by the Japanese to work on the jungle railway (see *Practical Prehistoric Society* for 1948). Hindu remains are scattered all over the country; it is also probable that for cents. T. remained trib. to the Cambodians. In 1350 the city of Ayuthia was estab. as the cap., and Uthong, the king, must be regarded as the first Thai monarch who ruled all T.; his dynasty lasted for 200 years. The modern hist. of the country begins with the usurpation of the throne by a Chinese gen. called Phya Tak, who settled himself at his new cap. of Bangkok after defeating the Burmese; he was the founder of modern T. In 1782 he was overthrown by one of his gens., who estab. the present dynasty. The intercourse between France

and the E. of the R. Mekong; the Thai were obliged to accede to the demands of the French after 10 days' blockade of the chief port. In 1895 negotiations took place between France and Britain concerning their respective frontiers, and in 1907 a further convention was made with France modifying and arranging the extra-territorial rights enjoyed by France and Great Britain. In 1909 a treaty was signed ceding to Great Britain suzerain rights over the S. states N. of Brit. Malaya. The treaty was costly to T., but opened up a mkt for the trade of Europe. A new commercial treaty was signed in 1925, giving T. jurisdictional and fiscal authority over these states. King Chulalongkorn, who d. in 1910, enjoyed a most illustrious reign, and assisted greatly in promoting the welfare of his country; his son who succeeded him was Vajiravudh, or Rama VI. He was succeeded by his brother, Prajadhipok, in 1925. A bloodless *coup d'état* in June 1932 estab. the monarchy, hitherto absolute, on a constitutional basis. In

1935 Prajadhipok abdicated and 10-year-old Ananda Mahidol was proclaimed king, a council of regency being appointed to act during his minority. T. declared war on Germany and Austria-Hungary in 1917, and became a member of the League of Nations. Hostilities between T. and Fr. Indo-China in 1940-1 ended by Jap. mediation, which was, of course, in no sense disinterested, Japan's object being to acquire T. herself as a jumping-off ground for the invasion of Burma and of India. Under a treaty of peace, 6 May 1941, Vichy France ceded to T. considerable tracts of ter. in Laos and Cambodia in return for a financial consideration. The non-aggression pact between T. and Great Britain, ratified at Bangkok on 2 July 1940, was, like that with France of the same year, soon stultified when Japan invaded Malaya. T., as a pawn in Jap. imperialist politics, declared war against Great Britain and the U.S.A. on 25 Jan. 1942. Aided by the Thai and subsequently by disaffected Burman elements the Japanese invaded Burma. Nearly 12 months later Bangkok was bombed by U.S. airmen for the first time (see further BURMA, SECOND WORLD WAR CAMPAIGNS IN).

Peace was signed on 1 Jan. 1946 between Britain and India on the one part and T. on the other, providing for the return to Britain of the 4 Malay and 2 Shan states ceded to T. by Japan in July 1945. Britain and India also undertook to support T.'s candidature for membership of the U.N. France, too, made peace, but not until nearly a year later. In 1946 T. appealed to the U.N. to lay her case before the Security Council concerning her Indo-Chinese frontier with France. On 17 Nov. 1946 she concluded a treaty with France by which she restored the Indo-Chinese ters. ceded by the Vichy gov. in 1941 and annulled the convention of Tokyo of 9 May 1941. The young king, Ananda Mahidol, was found murdered in a bedroom at the Barompinan Palace (9 June 1946) with a bullet wound in his head. He had spent the war years at Lausanne, where he was educ., and only returned to T. 6 months before his death or after an absence, save for his coronation, of 13 years. His younger brother, Phumibol Adulek (b. 1928), succeeded him. The council of regency was overthrown on 9 Nov. 1947, by a military *coup d'état* led by Pibul Songgram, a strong opponent of Communism, who thereby became Prime Minister and virtual dictator. Another *coup d'état* in 1951 restored the constitution of 1932 (whereby the monarchy had been made a constitutional one), and estab. F.-M. Pibul's position even more powerfully. T. was the first of the participating countries to ratify (Sept. 1954) the SE. Asia defence treaty.

Language and Literature. The language of the Thai belongs to the Tai group of the Thai-Chinese family; in T. the prevailing language is Lao, though many of the hill tribes have distinct languages of their own. Thai in writing is read from left to right, and in MS. there is no space

between the words, making it difficult for those who are not experts. The literature of the country consists mainly of mythological and historical legends, many of Indian origin; there are many works on astrology and the casting of horoscopes, on success in love affairs, and on magic; some are of great age. One class of literature worthy of mention is the *Niti*, or old tradition of good counsel, such as *Rules for the Conduct of Kings*; on such works the youth of T. are fed at present. The oldest monument in T. is the inscription of King Ram-Khamheng (1292), an example of Thai literary style. King Boroma-Trailoke-nath (1443-88) was one of T.'s greatest poets. See R. le May, *An Asian Arcady*, 1926, and *Siamese Tales* 1930.

Art and Music. Thai art is not generally exceptional, but the temple in Lampun and a number of temples in Bangkok are competent examples, with little variation, of styles of Buddhist architecture frequently found in India. Thai music is closely allied to that of India and Indonesia; it has a tone-system almost incomprehensible to W. ears. A style of dancing of great beauty has been evolved in which the whole body is used to convey expressions ranging from near-stupor to the heights of frenzy.

See Sir John Bowring, *The Kingdom and People of Siam*, 1857; K. Stumpf, *Tonsystem und Musik der Siamesen*, 1901; J. G. D. Campbell, *Siam in the Twentieth Century*, 1902; P. Loti, *Siam* (Eng. trans. by W. P. Baines), 1913; K. Döring, *Buddhistische Tempelanlagen in Siam*, 1920, and *Kunst und Kunstgewerbe in Siam*, 1925; W. A. R. Wood, *A History of Siam*, 1926; R. Wheatcroft, *Siam and Cambodia*, 1928; E. Koverup, *Friendly Siam*, 1928, and *The Coinage of Siam*, 1933; B. Swarup, *Theory of Indian Music*, 1933; P. L. Rivière, *Siam*, 1937; R. le May, *Concise History of Buddhist Art*, 1938; K. P. Landon, *Siam in Transition*, 1940; V. Thompson, *Thailand: the New Siam*, 1941; L. Vaillot, *Histoire de la danse*, 1942; H. G. Wales, *Ancient Siamese Government and Administration*, 1943; Sir J. Crosby, *Siam*; at *The Cross Roads*, 1945.

Thais, Athenian courtesan, who accompanied Alexander the Great on his expedition into Asia.

Thaler, abbreviation for Joachimsthaler, silver coins coined at Joachimsthal, Bohemia, in 1519. From 1857 to 1873 the T. was the unit of the Ger. monetary union, being equivalent to 3 marks, but after this it fell into disuse. The word dollar is derived from T.

Thales (fl. 600 BC), Gk philosopher, first of the Seven Sages (q.v.) of Greece, b. Miletus. He taught that water or moisture was the one element from which all things evolved. He appears to have owed much to the astronomy of the Egyptians and to the civilisation of Mesopotamia. He is regarded as the founder of abstract geometry, of the strict deductive form as shown in Euclid's collections; he is said to have shown how to calculate the distance of a ship at sea, and

the heights of objects. In astronomy he was credited by the ancients with the prediction of the total solar eclipse identified by Airy, Zech, and Hind with the date 28 May, 585 BC; he is said to have noted the 'Lesser Bear' and to have shown its superiority for the purposes of navigation.

Thalia: 1. Goddess of Comedy; see **MUSES**.

2. One of the Charites (Graces).

Thallium, metallic chemical element, symbol Tl, atomic number 81, atomic weight 204.2. It was discovered by Crookes (1861) in the seleniferous deposits from sulphuric acid manufacture. It occurs in small quantities in iron pyrites, and also occurs associated with copper, silver, and selenium in the mineral 'crookesite'. The metal is prepared by displacement from its solutions by means of zinc. T. compounds give a bright green line in the spectrum (hence the name, from Gk *thallōs*, a green shoot); some of them find a use in the manuf. of optical glass.

Thälmann, Ernst (1886-1944), Ger. Communist politician, b. Hamburg. He was a member of the Reichstag, 1924-33, and stood as Communist candidate for the presidency in 1932. After Hitler came to power T. was sent to a concentration camp and was probably executed at Buchenwald in Aug. 1944.

Thame, mkt tn and urb. dist. of Oxon., England. It is situated on the R. T., 13 m. from Oxford and 45 m. from London. Its chief building is the church of St Mary the Virgin, which is an exceptionally large church in mainly Early Eng. and Perpendicular style, containing some interesting brasses. T. has a 16th-cent. grammar school and a famous inn known as the 'Spread Eagle.' The riv. has its source in the Chiltern Hills and flows past T. to the Thames, which it joins near Dorchester; it is 35 m. long. Pop. 3600.

Thames, riv. of England, rises near Cirencester in the Cotswold Hills and follows a course of 210 m. to the Nore, where it debouches into the North Sea. It is England's largest and most important riv. At Gravesend, the head of the estuary, it has a width of $\frac{1}{2}$ m., gradually increasing thence to 10 m. at the Nore. Tidal waters reach Teddington, 60 m. from the mouth, where is the first lock from the sea (except for the tidal lock at Richmond). There are in all 47 locks, St John's Lock, Lechlade, being nearest the source. The normal rise and fall of the tide is from 15 to 23 ft at London Bridge and from 13 to 19 ft at Tilbury. Until the Tower Bridge was built, London Bridge was the lowest in the course; the reach between these 2 bridges is known as the 'Pool of London.' Lying some 5 m. SW. of the Nore (q.v.) is the mouth of the Medway (q.v.) estuary, at the head of which lie Chatham with important naval dockyards, Gillingham, and Rochester (q.v.). Gravesend (q.v.) on the S. bank of the riv. some 24 m. from the Nore, has developed at a point where vessels formerly awaited the turn of the tide.

Tilbury (q.v.), important as the terminus of many ocean-going liners, lies opposite Gravesend on the N. bank. At Woolwich (q.v.), some 20 m. above Tilbury, is the arsenal; Greenwich (q.v.), a little farther up-riv., has the Royal Naval College. Between Tilbury and London Bridge (some 26 m. up-stream) stretches the London dock system and many wharves. The embankments of the T. in London were the work of Sir Joseph Bazalgette (1819-91) (q.v.), chief engineer of the Metropolitan Board of Works. The Albert Embankment on the S. side was completed in 1869, the Victoria Embankment from Westminster to Blackfriars in 1870, and the Chelsea Embankment from the Royal Hospital to Battersea Bridge in 1874. In Jan. 1949 work was started on a new embankment, designed by J. Rawlinson, chief engineer of the L.C.C., on the S. side from County Hall to Waterloo Bridge. The riv. is spanned by over 50 bridges, including Tower Bridge (a bascule bridge), and suspension bridges at Hammersmith and Marlow. The chief tunnels under the T. are the T. Tunnel, completed by Brunel in 1841, now used for railway only, the Blackwall Tunnel (1897) from E. India Dock Road to E. Greenwich, and Rotherhithe Tunnel (1918) from Shadwell to Rotherhithe. In 1948 a scheme was put on foot for the maintenance of the tow-paths from Teddington to Cricklade as a riverside walk. The Port of London Authority (q.v.) is responsible for the control and conservation of the riv. below Teddington; above Teddington the T. Conservancy (q.v.) is the responsible authority.

Steamers ply regularly from Kingston to Folly Bridge, Oxford, during the summer. The scenery along this part of the riv. is pleasant, varied, and in some places beautiful, e.g. at Cliveden, Cookham, Sonning, and Pangbourne. There are fine bridges at Richmond, Hampton Court, Chertsey, Maidenhead, and Shillingford. Henley, Wallingford, Dorchester, and Abingdon are pleasant places, and Eton and Windsor (qq.v.) are famous. Above Folly Bridge the riv. passes gasworks and allotments, but these may be abolished when Oxford finally agrees on its plans for future development. Skirting the breezy expanse of Port Meadow, the riv. passes Godstow and the lovely Wytham Woods. From here all along the 50 m. to its source beneath a tree in 'Trewsbury Mead,' the T. glides through tranquil meadows, its course interrupted only by the small tns or vills. of Lechlade and Cricklade and the charming stone-built hamlets of Kelmscott and Ashton Keynes. In these upper reaches there are 2 picturesque medieval bridges—New Bridge and Radcot Bridge. Motor launches can reach Lechlade; beyond that point it is possible to canoe up to Cricklade, but the final 10 m. to the source of the T. is best traversed on foot, through great meadows spangled in spring with cowslips and fritillaries. It is a peaceful and most attractive walk.

Until the 19th cent. the London T. was an important means of transport for passengers; the names of 'stairs' are

traces of the great passenger barge traffic. Since the Second World War passenger traffic on the T. has been revived by 'water buses'. The T. has been frozen over at various times, the earliest recorded occasion being AD 1150. See H. Belloc, *The Historic Thames*, 1914; J. H. Salter, *Guide to the Thames* (31st ed.), 1929; C. P. Smith, *The Thames*, 1931; A. Bell, *Said Noble River*, 1937; A. G. Thompson, *The River Thames*, 1937; Robert Gibbings, *Sweet Thames Run Softly*, 1940; M. S. Briggs, *Down the Thames*, 1949.

Thames, riv. of Canada, which flows across the Lakes Peninsula in Ontario, between Lakes Erie and Huron, and into Lake St Clair, after a course of 150 m. The chief city on it is London (q.v.).

Thames, New Zealand, gold-mining centre, 46 m. ESE. of Auckland in T. Co., N. Is. Pop. 5007.

Thames Conservancy. The conservation of the Thames was granted to the Conservators of the River Thames (the T. C.) in 1857, the powers being reconstituted in 1894. The duties relative to the lower part of the riv. devolved upon the Corporation of London until 1857, those relative to the upper part upon the Upper Thames Commissioners until 1866, when under the Thames Navigation Act the riv. from Staines to Cricklade, Wilts, was added to the Conservators' jurisdiction. The Port of London Authority (q.v.), by an Act of 1908, took over all rights and duties of the Conservators in respect of the riv. below Teddington. Since that date the Conservators' powers and duties have been further amended by the Thames Conservancy Acts of 1910, 1911, 1921, and 1924, and subsequently consolidated in the Thames Conservancy Act, 1932. This Act was amended by the Thames Conservancy Act of 1950, when the number of Conservators was increased to 38. By the Land Drainage Act, 1930, the Conservators were constituted the Drainage Board of the Thames Catchment Area, and exercise jurisdiction over 2392 m. of 'main riv.', comprising the Thames itself above Teddington and part or the whole of certain tribs. The riv. above Teddington Lock towards its source is exclusively governed by the by-laws of the T. C. Board. The prin. duties of the board have to do with the preservation of the riv. from pollution, both in the main stream and in tribs., the protection of fisheries, the control of navigation, and drainage, etc.

Thames Ditton, residential dist. of Surrey, England, forming part of the urb. dist. of Ksher. The Swan and Angel Hotels are 16th-cent. foundations, and there are almshouses of the early 18th cent. Pop. 9600.

Thane, or **Thegn**, A.-S. rank, which originally seems to have been applied to the personal followers of the king and had a distinct military significance. Early laws give the werigild (q.v.) of a T. as between that of a ceorl and an earl. The complex society of later Saxon England suggests that the T. was no longer confined to a class of fighting nobles, bound to the king by personal loyalty, but could

include successful merchants and ceorls. It appears to have become essentially a mark of social standing. Historians no longer suggest that the Norman knight derived from the Eng. T. The T.s did not hold their land by military tenure, but were bound to fight for their king by bonds of loyalty. They received their lands of him as a reward for past services. See Sir F. Stenton, *Anglo-Saxon England*, 1943.

Thanet, Isle of, extreme E. part of Kent which was formerly separated from the mainland by the R. Wantsum which remained in part navigable up to the end of the 15th cent. Ebbsfleet is generally accepted as the landing place of the Saxons in AD 449, and in the same area St Augustine and the Christian missionaries made landfall in 597. The is. was in the full stream of Brit. hist. for many cents., and its famous churches bear evidence of its great importance from early times. It has exceptionally bracing air, and is now well known for its watering-places of Margate, Broadstairs, and Ramsgate, the latter being also a seaport with a busy harbour. See J. Lewis, *The History and Antiquities . . . of the Isle of Thanet* (2nd ed.), 1736.

Thanet Sands, lowest div. of the Eocene system (q.v.) exposed along the margin of the chalk in the E. part of the Thames Basin and particularly in K. Kent, especially in the Thanet dist. Some 70 species of marine fossils are known. T. sand is used for moulding; its occurrence in W. Kent determined the site of Woolwich Arsenal.

Thanh-hoa, cap. of prov. of same name in N. Annam (q.v.) and situated 2 m. S. of the R. Ma, 15 m. from the sea. There is a citadel, a Rom. Catholic cathedral, and a centre for the old triennial examinations held by the imperial court of Viet Nam. The prov. produces large quantities of rice, and pottery is manuf.

Thanksgiving Day, ann. festival of thanksgiving in the U.S.A., celebrated as a national holiday according to the choice of President Lincoln in 1864, on the last Thursday in Nov. In 1941 President Roosevelt further defined the date of celebration as the fourth Thursday in Nov. It is in essence a national harvest celebration, and was first observed by the Pilgrim Fathers at Plymouth in 1621, after they had gathered in their first harvest.

Thann, Fr. tn. cap. of an arron., in the dept of Haut-Rhin, on the Thur. It has a fine 14th-16th-cent. church, and famous vineyards. There are textile and machinery manufs. Pop. 6000.

Thapsus, anc. city of N. Africa, 30 m. SE. of Susa. In 46 BC Julius Caesar here routed the Pompeians under Cato, Scipio, and Juba, so ending the war in Africa.

Tharaud, brothers, Jérôme (1874-1953), Jean (1877-1952), Fr. writers. Their reputation is based primarily on their jointly signed travel stories. They describe with great precision and soberness the picturesque life in Morocco (*Rabat*, 1918; *Marrakech*, 1920); they give an

account of their impressions on the Balkan war (*La Bataille à Scutari d'Alban*, 1917); they discuss conditions in the Holy Land and in different Jewish communities (*Quand Israël est roi*, 1922; *L'an prochain à Jérusalem*, 1924). Later works include *Vienne la Rouge*, 1934, *Le Passant d'Éthiopie*, 1936, and *Cruelle Espagne*, 1937. Jérôme was reporter in many different parts of the world, and their works combine the precision of the reporter style with a classical elegance and a great gift of evocation. Jérôme was elected to the Fr. Academy in 1940, Jean in 1946. See J. Bonnerot, *Jérôme et Jean Tharaud*, 1927.

Tharawady, tn and dist. of Lower Burma. Rice is produced. The cap. is T., 68 m. NW. of Rangoon. Area 2851 sq. m.; pop. (dist.) 594,000; (tn) 9000.

Thasos, or **Thasus**, is, in the N. of the Aegean Sea, off the coast of Thrace, supposed to have derived its name from Thasos, son of Poseidon or Agenor, leader of the Phoenicians. It was early taken possession of by the Phoenicians, on account of its valuable gold mines. T. was afterwards colonised by the Parians, 708 BC, and among the colonists was the poet Archilochus. The Thasians once possessed a considerable ter. on the coast of Thrace, and were one of the richest and most powerful peoples in the N. of the Aegean. They were subdued by the Persians under Mardonius, and subsequently became part of the Athenian maritime empire, though they revolted against Athenian rule unsuccessfully sev. times.

Thatching, art of roofing houses or protecting stacks of hay or grain with a covering of reeds, rushes, straw, etc. Thatch should be at least 12 in. in thickness and laid to a pitch of 45 degrees. Best or true Norfolk reed is used in T. Norfolk reed with an admixture of lesser reed mace lasts longer, besides being less expensive than best reed. Wheat or rye straw is considerably cheaper than reed, but may require renewal after 20 years, whereas reed thatch should last about 75 years. Heather also provides a durable thatch but in exposed places is liable to strip.

Thaton, tn and dist. of Lower Burma, in the Tenasserim div., formerly a seaport, and the cap. of the Mon kingdom, now about 10 m. from the sea. Area of dist. 4890 m.; pop. (dist.) 594,000; (tn) 21 600.

Thau, Étang de, Fr. lagoon in the dept of Hérault. On the narrow strip of land separating it from the Mediterranean is situated the tn of Sète (q.v.).

Thaulow, Frits (1847-1906), Norwegian painter. During his early days he was a pupil of the Norwegian romantic painter Gude (q.v.); later, when in Paris in the 1870s, he came under the influence of Corot and Daubigny. After his return to Norway he was known especially for his landscape paintings of wintry scenes in Norway. He is represented in the Nasjonalgalleriet, Oslo.

Thaw, the melting of snow and ice. A partial and temporary T. may be caused by the sun's heat in the hours around

noon; but a permanent T., particularly in the Brit. Is., is mostly due to a complete change of air mass, as for instance from northerly or easterly winds to comparatively warm westerly winds from the Atlantic. In northerly or cold continental regions the 'spring T.' is a pronounced ann. event, the ice-bound seas, lakes, and rivs. breaking up and the winter snows melting.

Thaxted, tn of Essex, England, 7 m. N. of Great Dunmow. It was important in medieval times, and was formerly a bor., incorporated by charter of Philip and Mary. It is famous for its massive Perpendicular church, which has a fine crocheted spire (181 ft), and is one of the finest in Essex. The guildhall in Town Street is a picturesque, 3-storeyed timber-framed building of mid-15th-cent. date, and is of great interest as it is one of the few remaining medieval guildhalls in England. Horham Hall is in the par. Pop. 1800.

Thayet-myo, cap. of the dist. of T., Lower Burma, on the Irrawaddy. The chief products are rice, cotton, and oilseeds. Pop. (dist) 297,500; (tn) 15,000.

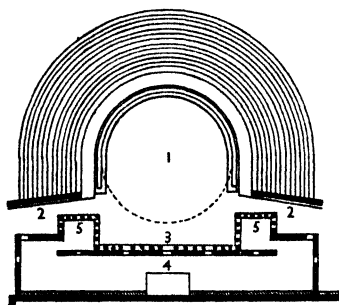
Theatines, Rom. Catholic religious order of priests, marked by its extreme observance of poverty. They were founded in 1524 by Gaetano dei Conti (1480-1547), canonised in 1671, and Giovanni Caraffa, afterwards Pope Paul IV, with the object of restoring the standard of clerical life and recalling the laity to the practice of virtue. They exist to-day mainly in Italy. There are also Theatine nuns, founded by Ursula Benincasa in 1583.

Theatre, place designed for enabling an audience to see the performance of plays, consisting of a stage and an auditorium, with ancillary accommodation for actors and audience.

Greece. The religious origins of the drama (q.v.) made it from the beginning essentially a popular art so that the T. in which it was presented had to provide ample standing and, later, seating accommodation for the participating spectators. In the earliest T.s these simple requirements were met by a suitable hillside with a level circular space (*orchestra*, orchestra) at the bottom, in the centre of which an altar was erected. The primitive Gk T. thus assumed its shape, having seats in a slightly extended semicircle (the *theatron* or auditorium) around the orchestra. At Athens, about 465 BC, the orchestra was moved 50 ft forward, and on the farther side a small wooden hut (*skênê*) was built as a dressing-room for the actors. It had a long front wall with projecting wings towards either end, between which a stage was probably raised a ft above the level of the orchestra. This stage was possibly backed by a row of columns (*proskênion*, proscenium), originally also of wood, behind which was the wall pierced by doors for the actors' entrances and exits. At each end of the extended semicircle of the auditorium was a passageway (*parodos*), between stage and auditorium.

By the 3rd and 2nd cents. BC, the chorus had practically disappeared from

tragedy, and though choral odes were still retained in comedy, they had become separate interludes. The *skéné* was generally 2-storeyed, with a row of columns some 10 ft in front, the spaces between filled in with painted boards, and on top a platform on which the actors performed. Immediately behind and above this was the *proscenium*, which usually had 3 doors. By Graeco-Rom. times the stage front and the background had been altered. The *proscenium* was more elaborate, and dominated the T. with its columns, doors (7 at Ephesus), and architectural embellishments. Spectacular scenic effects were eagerly sought. Projecting wings (*paraskénia*) now formed part of the structure of the T. Low platforms carrying scenic effects could be pushed on to the stage through the doors; semicircular and triangular turntables painted with tragic, comic, and satiric designs; a hook-and-pulley device for lowering and raising divinities from and to the heavens; trap-doors in the orchestra



A GREEK THEATRE

This diagram shows the lowest part of the auditorium and the *skene* of the Theatre of Lykurgos at Athens.

1, orchestra; 2, 2, *parodoi*; 3, *proscenion*; 4, *skene*; 5, 5, *paraskénia*.

through which ghosts and spirits could appear; means of producing thunder and lightning, fires, etc., are all either recorded or to be inferred from a study of the plays. Stage costume was highly stylised. Certain conventions fully estab. by Aeschylus's day remained unchanged from then till Rom. times. Although the earlier tragedies and comedies had usually been set in the legendary era, the tragic actor's dress was always that of the 5th cent. (see COSTUME DESIGN, THEATRICAL).

The Rom. T. differed from the Gk T., first, in having nothing to do with religion, and secondly, in being built on level instead of sloping ground, possibly for the sake of a more imposing architectural exterior. The auditorium was an exact semicircle around the orchestra space, the farther half occupied by the stage, the front half being used sometimes

for additional seating accommodation and sometimes for gladiatorial or other spectacular displays, when it could be rolled off to protect the audience. The stage doors in the front wall (*hyposcenium*) and steps down from the stage to the orchestra were usual. This wall was no longer plain but decorated in keeping with the embellishment of the *frons scenae* at the back of the stage, from which a roof reached out over it. Awnings over the auditorium were also provided. The earlier elaborate portals over the *parodoi* were transformed into covered passages.

Gk tragedy and comedy introduced to Rome degenerated into dance and satirical mime, and the status of the Rom. actor never approached the dignity of that of his Gk predecessor. In the original Gk drama the poet himself would play the leading part and train the chorus. Actors were originally amateurs, but later companies of actors were formed with their own guild and were held in high esteem. In Rome the custom of maintaining permanent troupes of actors, mostly slaves, and the introduction of women to the stage, made the profession generally despised.

The Middle Ages. Though the T.s were destroyed by Lombard invasion in the 6th cent., the players survived. The rich had always hired them for private entertainments, and continued to do so. The barbarians, moreover, were accustomed to keep court poets to enshrine their triumphs in epic narrative. By AD 800 these 2 employments merged in the household minstrel (*menestrier*). Less fortunate actors took to the road and became tumblers, acrobats, puppet-masters, dancers, singers, masks, etc., known generally as *jongleurs*, and these with the later *goliardi*, the wandering scholars (mostly defrocked clerks and students travelling between the univs.), noted for their ribald satires, formed the vast body of nomad players, the *histriotes*, of the 11th to 13th cents.

Once again the T. was reborn of religion when in the 10th cent., on the occasions of the greater feasts of Easter and Christmas, there began to be introduced extralitururgical anthems, originally sung antiphonally by the clergy and later accompanied by actions, such as the *Quem queritis* of Easter Day (see also EASTER SEPULCHRE). They served to illustrate the gospel stories and were actual interpolations in the services of the church. Out of these simple beginnings grew the play-cycles covering the full stories of the Resurrection and the Nativity. The plays became so popular that early in the 12th cent. the crowds were more than the churches could hold. Performances were given in refectories and in the open—the churchyard or the market-place. The plays were arranged as they had been inside the church, the settings for each scene, wooden platforms and stages, known in England as 'houses,' erected in front and on either side of a cross in the same relative position to it as before they had been to the main altar (see MIRACLE PLAY).

On the Continent such stationary settings were the general rule, but in England, with a few exceptions, it became the practice to mount the 'houses' on wheels and tour the town in procession, each 'house' stopping to perform its scene at pre-arranged stages. By the 13th cent. the whole of hist. from the Creation to the Judgment was incorporated in the various cycles, and the clergy, even helped out by the wandering scholars, were unable to provide enough actors for the major festivals. The laity were thus called in to take part, and between 1350 and 1450 they gradually took over the financing, production, and entire control of all public performances.

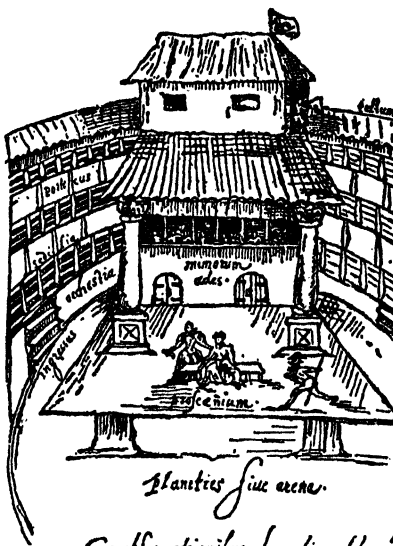
Similar conditions prevailed on the Continent, except that there the plays were also produced by companies of actors which had no counterpart in England. In France the most famous of these was the *Confrérie de la Passion*, estab. by royal patent in 1402, and the first permanent theatrical troupe to have its own T. in Europe.

Renaissance: Italy. In Italy during the Renaissance companies of young men specially associating for the purpose, more after the Fr. than the Eng. manner, had taken over the miracle plays (*sacre rappresentazioni*) from the Church, while the travelling players, starting from fair-ground and street corner, had by the 16th cent. evolved the unsurpassed *Commedia dell'Arte* (q.v.). At the turn of the 15th cent. the contemporary study of perspective was applied to theatrical *décor* and a type of classicised medieval multiple-setting evolved. In 1551 Sebastiano Serlio in his *Architettura* advocated a synthesis of classical and medieval practice in a stage on which stock settings with corresponding perspective back cloths could be erected according to the play performed. These settings were constructed, like the medieval 'houses,' in canvas and lath, which would give them an appearance of solidity. The action of the play took place as in classical and medieval practice in the open (on the *platea*). The Teatro Olimpico at Vicenza, built (1580-4) to the design of Palladio, combined Rom. solidity with medieval multiplicity. A long, narrow front stage was backed by an ornamental architectural proscenium, with a perspective view shown through a large central arch (the former *porta regia*), flanked on either side by small doors. The Teatro Farnese at Parma (1618-19) introduced the proscenium arch, and was also the first T. to have seats in the orchestra up to the stage. Accounts of classical 'machines' were studied and ingenious scenic effects contrived; movable scenery is first heard of at Venice in 1639. A curtain was installed, but was mostly used only at the beginning of a performance to surprise the audience by the sudden revelation of a particularly striking opening set.

Renaissance: France. As Renaissance ideas reached France, medieval and classical methods were similarly though more directly combined. Fr. drama did not yet observe the unities as strictly as It.,

and to present the sev. settings required for each play *décor simultané* was used, as many Serlesque type 'houses' and perspectives being set up together on the stage as a play required. Scaliger's comment, in 1561, that actors in France when silent were presumed not to be on the stage, is in keeping with this system of production.

The Elizabethan Stage. In England the traditional drama, the new classical influence, and humanist teaching were alike dominated by the Reformation. The first public T., known as The Theatre, was built in 1576 by an actor, James Burbage, who, to escape interference by the city authorities, chose a site at Shore-ditch outside the city walls. Within a



Ex observationibus Londinensibus
Johannis De Witt

THE ELIZABETHAN THEATRE

The Swan, on Bankside: a reproduction, reduced, of a drawing by Arend van Buchell.

year a second T. called the Curtain was built not far away. We know nothing about these except that they were regarded as 'sumptuous.' The Swan was built by Francis Langley about 1595. A drawing of this building, made by a Dutchman, Arend van Buchell, based on a description given him by his friend Johannes de Witt of Utrecht, who visited the T. in 1596, is the earliest information we have about these first London T.s. It shows a building of 3 galleries, which are roofed, and in the galleries are seats; the centre is open to the sky, and there

is a large platform stage; there is standing space for spectators on 3 sides. The drawing shows 3 people acting on the stage. Over the stage is a canopy, known as the heavens, which in the drawing covers only a small part of the stage, but was probably over the whole of it. At the rear of the stage there are 2 doors, and over them a balcony, with people in it. At the top there is a thatched room with a flag and a trumpeter. The Swan was said to accommodate in its seats 3000 persons, which was probably an exaggeration, for a large number of spectators had to stand in the pit. In 1599 there was built the most famous of all T.s, the Globe, also on Bankside. It was a handsome building, constructed of timber, plastered, with thatched roof, surpassing all the other T.s, but practically nothing is known about it except by conjecture, based upon references to the building in plays, etc., and upon the contract for building the Fortune T. shortly after, which refers to the Globe. It is conjectured that it was 84 ft wide between the outer walls and that the width of the pit was 58 ft. There were 3 roofed galleries, with 3 rows of seats in each. The stage was, possibly, 43 ft long and 23 ft wide, and extended to the middle of the pit: there was a heavens or canopy over it; at the back there were doors at each side, and in the centre a curtained inner stage. Over the inner stage there was a balcony, also curtained, which may have projected. There were traps in the floor of the stage for ghosts, etc. Actors and properties could be let down from the heavens. There was one entrance to the T. for spectators and another at the rear of the stage for the actors; the 'tiring' rooms for the actors were at the rear of the stage, probably on sev. floors. The admission was 1d., increased for special performances, which entitled to standing room in the pit. Those who wanted to go into the galleries paid another 1d. for entrance to the gallery staircase, which allowed for a seat in the third gallery; if a seat in the first and second gallery was required a third 1d. would be paid. The galleries on each side of the stage contained gentlemen's boxes, for a seat in which 1s. would be charged. Spectators were allowed on the stage, for which perhaps 1s. was charged. Performances were given in the afternoon, by daylight; on such a stage Shakespeare's plays were performed. There can be little doubt that the open platform stage enabled Shakespeare to do all he wished. It was richly decorated, elaborate properties would be used, and the dressing of the actors was magnificent. Heraldry and music were important features. The Fortune T. was built by Philip Henslowe and Edward Alleyn, the actor, in the par. of St Giles, Cripplegate Without, in 1600. It was square, 80 ft each way, constructed of wood or a brick and tile foundation and covered with plaster. It was 3 storeys high. It was burnt down in 1621 and rebuilt at once, but dismantled in 1649. London was well supplied with T.s. until the Civil war

put an end to all theatrical activity. There were one or two T.s with roofs called 'private theatres,' notably the Blackfriars and the Cockpit.

The masque was a private entertainment of an expensive and elaborate kind given in palaces or lords' houses. It consisted of scenic display, dancing, and music, in which the guests took part, and was not considered to have any relation to the T. Inigo Jones designed a building for these entertainments at Whitehall known as the Cockpit in which plays were given at the Restoration (see MASQUE).

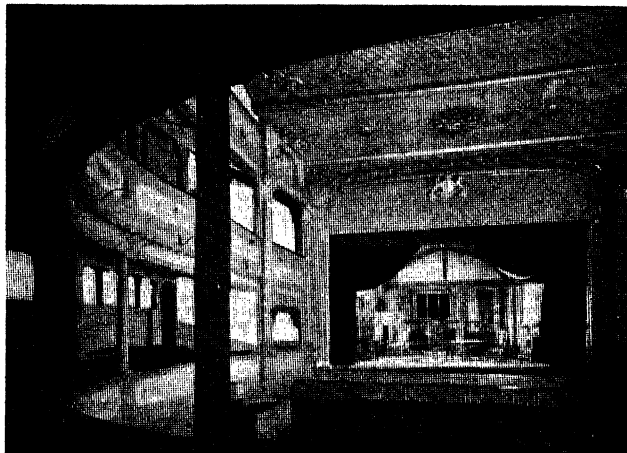
The Restoration Theatre. When Charles II came back from exile with ideas of the Fr. and It. T.s, which were entirely different from the old Eng. T., he gave patents to Sir W. Davenant and to Thomas Killigrew to set up 2 companies of players, Davenant's to be his brother James's and Killigrew's to be his own, and to build T.s. They got to work at once and performed in converted tennis courts and other buildings, until Killigrew took a site in Bridges Street and in 1663 opened the first T. Royal, Drury Lane, to become one of the most famous T.s in the world. It was a covered T. with a glass roof, benches in the pit, 2 galleries, a royal box at the back in the centre, and a stage rather like that of the old T.s except that scenery in perspective could be used on it. Performances were still given in the afternoon by daylight. Then Davenant instructed Sir Christopher Wren to design a new T. for his company. This was opened as the Duke's House in 1671, and was a wonderful building, seating 1000, with an enormous gilt proscenium arch, on the top of which was situated the orchestra; the scenes were placed behind the arch, while the acting took place on the stage in front of it.

On 25 Jan. 1672 the T. Royal was burnt down and a second T., designed by Sir Christopher Wren, was opened in 1674. This T. lasted until 1791. It was rectangular, with 3 galleries, each with 4 rows of seats, the first gallery being divided into boxes; the entire floor was devoted to the benches for the pit. The stage projected 17 ft beyond the proscenium arch; on each side there were 2 proscenium doors with windows over them. Neither T. was popular and in 1682 the 2 companies were amalgamated and played at the T. Royal, abandoning the Duke's House. There are sev. points to be noted in the Restoration T., which entirely transformed the drama and acting from what they had been in England. The first is that women appeared on the stage, for it was Charles's order that they should do so, and he inserted a clause to that effect in the charter of Drury Lane Theatre. Women had never appeared on the Eng. stage (except when a Fr. company visited London), for acting had been done by men and boys. It was part of the Puritan objection to the T. that boys dressed up as women. The appearance of actresses transformed the drama, and they soon took a predominating part, often appearing in men's parts, and plays were written to exploit their charms, and

movable scenery was also used. Spectacle for its own sake became one of the leading features of the T. The audience was placed farther and farther from the stage so as to get the full advantage of the scenes in perspective, and the apron stage became more and more reduced; then the actors were forced to play in the scenes, though for a long period, indeed until the first quarter of the 19th cent., they insisted on using the apron too. Thus arose the 'picture-frame' stage and the convention of the 'fourth wall.' Finally, the 2 patents granted by Charles had created a monopoly, the most effective stranglehold upon the T.s that could have been conceived.

joining the W. End of London, with a number of 'private' T.s and a number of T.s in the suburbs. The designs of all the T.s are largely based on Wyatt's Drury Lane, being smaller versions of what is practically a Fr. form of T. building. There are no really modern buildings in London. This applies to other cities in England; also to Stratford-on-Avon, where the original Shakespeare Memorial T., opened in 1879, was burnt down in 1926; it was rebuilt in 1932, but repeated the general plan of the Fr. T.

18th Century: Italy. In Italy throughout the 18th cent. there was considerable theatrical activity, and, abandoning the original Renaissance rectangular build-



Architectural Review

A GEORGIAN THEATRE

A view of the auditorium and stage, from the lower circle, of the Theatre Royal, Bristol (q.v.).

18th and 19th Centuries: England. The heaviest blow the T. sustained was Horace Walpole's Licensing Act of 1737, which prohibited T.s anywhere except by the authority of letters patent from the king or a licence from the lord chamberlain. Not until 1788 was this severe restriction upon building relaxed, when an Act enabled T.s to be built under justices' licence, though it did not apply to London or 20 m. around.

In London, however, the T. monopoly continued, and there was continual rivalry between the 2 patent T.s of Drury Lane and Covent Garden. They both opposed the unlicensed playhouses, which had no legal right to produce legitimate drama. There was great objection to the monopoly, and in 1843 the Theatre Act was passed, which, with minor amendments, governs the T. throughout the country to-day (see THEATRES, LAWS RELATING TO). There were in 1950 42 T.s in or ad-

ings, many new T.s were built in semi-circular and horseshoe form. The main experimentation was in the position of the proscenium arch. At first action was placed before it, the scenes being set behind, but early in the cent. all action was placed behind the arch, the platform stage being completely abolished. This form of stage was copied in France, whence a cent. later it was transported to England. There was practically no development in T. building anywhere throughout the 19th cent. and the picture-frame stage was firmly estab. for spectacle and realism.

20th Century. The most important influence in the 20th cent. T. was Gordon Craig's, whose ideas of staging were so inappropriate to the picture-frame T., however, that his ideas of production could not be reconciled with the requirements of the commercial T. Craig's ideas were the basis of the work of Max Rein-

hardt in Germany and Austria, where in great spectacular shows such as *The Miracle*, and in performances at the Grosses Schauspielhaus in Berlin, he applied Craig's simplicity, immensity, and theatrical effectiveness. In France Jacques Copeau at the Théâtre du Vieux Colombar transformed the stage into a semi-permanent setting for plays.

In the U.S.A. the estab. of the T. was slow, owing to Puritan opposition, but made headway in the 19th cent., when much T. building was carried out; but the centre of the commercial T. remains in New York city, where it is a leading element in the city's entertainment industry. The T.s were built on European designs, and no developments took place. In the little T.s that sprang up all over the country under amateur control a good deal of experimentation was done in modernising the stage and in the creating of intimate T.s, and a T. is now a normal part of Amer. univ. equipment. The Folger Shakespeare Library in Washington, the greatest Shakespearian collection in the world, is housed in a building constructed on the design of an Elizabethan playhouse, the detailed contract for the Fortune T. of 1600 being closely followed. Thus America has an example of a Shakespearian playhouse, but it is not used for performances. Stage design in America owes much to the work of Robert Edmond Jones and Norman Bel Geddes, and today the expressionist or constructivist setting is often seen in use.

Production and Management. The original acting companies in the Elizabethan T. were self-governing, and Shakespeare's company, known as the King's, had its own T.s, the Globe and the Blackfriars. Other Elizabethan T.s were built by business men such as Philip Henslowe, who for a period had Edward Alleyn the actor as partner, and by building speculators. At the Restoration the 2 London T.s were built by the patentees, who had financial support from investors. The Brit. T. has continued to be a private enterprise in London and throughout the country. Generally speaking, the ownership and management of T.s has been in other hands than those responsible for the production of plays, though there have been exceptions. The production of plays is mainly in the hands of commercial groups, who with their own money or the money of 'backers' provide the considerable finance required. Some of these commercial groups, which operate in London and in most large cities, are on a permanent basis. There are exceptions to these commercial interests, such as the Old Vic, some of the repertory companies, the Stratford-on-Avon Shakespeare Festival Company, and other companies formed with the object of sustaining theatrical art. The Arts Council is a gov.-appointed body with Treasury support (formed in 1940 as C.E.M.A.), one of whose objects is to support the T. as an art.

In France, Germany, and many other countries the T. has been under state or royal patronage, the T. being provided and the performances given as national

or civic enterprises, but most T.s are private enterprises. In Soviet Russia and other Communist-controlled countries the T. is state controlled and used for propaganda and public education. In England public money is now being made available for the T.

The Brit. Gov. is to provide the sum of £1m. for a National T. on a site provided by the London Co. Council, but economic conditions have not yet allowed the scheme to be carried out. Under the Local Government Act, 1948, local authorities are empowered to build and manage T.s. At present the stage is organised to provide pictures in perspective or interior sets of a realistic kind. Stage management is a highly specialised occupation observing, largely, traditional methods. Some stages (e.g. Drury Lane) have mechanical devices enabling the floors to be raised or lowered in sections, and all stages provide for scenery, sometimes complete sets, to be 'flown.' The use of the space over the stage for raising or lowering properties or actors has existed since the Elizabethan T. with its 'heavens.' Movable floors (e.g. Stratford-on-Avon Memorial T.) enable settings to be transposed into the 'wings,' and revolving stages are often employed. Stage lighting is now sometimes operated by remote control from the auditorium.

Acting. The essential art of the T. is acting, to which all other theatrical arts are subordinate. At all times acting has been conditioned by theatrical buildings as well as by the requirements of the drama, so that there have been considerable differences in acting from period to period and from country to country. The original Gk actors were the dramatists who took the part of the protagonist, and the poet Thespis (535 BC) gave his name to the art of acting. When plays in the 5th cent. were first performed by professional actors they were always men. The most famous Rom. actor was Quintus Roscius (d. 62 BC), excellent in tragedy and comedy, who wrote a work on acting. Women did not perform on the Rom. stage until the 2nd cent. AD, when spectacle and pantomime were the main dramatic fare. By the 6th cent. there was an end of acting in Europe. Its revival came through the teaching of the clergy both in Church and schools, and in the Middle Ages there were performances everywhere, by amateurs, of mystery, allegorical, and comic plays. Companies of actors existed in England from the 15th cent. onwards, attached to the households of great lords. In Italy in the 16th cent. arose the *Commedia dell'Arte*, one of the greatest schools of comedy acting. In the 16th cent. the Burbages estab. the actor's art as a permanent feature of London life. Thereafter there were many famous actors, the first being Richard Burbage and Edward Alleyn, and there is evidence that Shakespeare was an actor. Continental acting was early adapted to the picture-frame stage, but Eng. acting did not fully accommodate itself to this form of staging until the 19th cent. No school of acting exists in

England comparable with the *Comédie Française*, which since the late 17th cent. has maintained a standard of classical acting in France. The feature of Eng. acting has always been its naturalism. At all times the activities of amateur actors have been considerable in England, and amateur drama is now one of the most important cultural activities in the country, the number of amateur societies being reckoned to be 25,000.

See also CENSORSHIP OF THE DRAMA; *COMÉDIE FRANÇAISE*; *COMMEDIA DELL'ARTE*; COSTUME DESIGN; THEATRICAL; DRAMA; MIRACLE PLAYS; NATIONAL THEATRE; REPERTORY THEATRE; THEATRES, LAWS RELATING TO; and individual articles on actors, actresses, and theatres.

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Théâtre Libre, see FRENCH LITERATURE.

Théâtre Royal. In London Drury Lane Theatre (q.v.), the Haymarket Theatre (q.v.), and the Royal Opera House, Covent Garden (see COVENT GARDEN THEATRE) are permitted to use this title. The title of T. R. in respect of the Haymarket was granted only for the lifetime of Samuel Foote (d. 1777).

Theatre Royal, Bristol, oldest playhouse in England, opened in 1766. The plan owes much to the Drury Lane Theatre of 1674, but the auditorium is believed to be the first in England constructed in a horseshoe shape. After its opening licensing difficulties were experienced until, in 1778 by a special Act of Parliament, letters patent were granted. Almost every actor of note since 1766, except David Garrick, has appeared on its boards. The theatre is now under the control of the Arts Council, and is the home of the Bristol Old Vic Company.

Theatres, Laws Relating to. By the Theatres Act, 1843, all theatres for the 'performance of stage-plays' must be licensed. Stage-play by section 23 includes 'every tragedy, comedy, farce, opera, burlesque, interlude, melodrama,

pantomime, or other entertainment of the stage.' The lord chamberlain is the licensing authority as to all theatres (except patent theatres, the only existing examples of which are Drury Lane and Covent Garden) within the parl. boundaries of London and Westminster, and in the bors. of Finsbury, Marylebone, Tower Hamlets, Lambeth, Southwark, New Windsor, and Brighton. In co. bors. the licences are granted by the tn councils, in non-co. bors. by the co. council, while the L.C.C. is the authority for those parts of London which are not within the jurisdiction of the lord chamberlain. A licence will be granted to the manager of the theatre only. (As to licensing of plays, see CENSORSHIP OF THE DRAMA.) *Keeping a theatre* without a licence entails a penalty of £20 for every day; *representing* for hire a stage play in an unlicensed place, a daily penalty of £10; *performing* in public a new play without the leave of the censor, £50, and avoidance of the theatre licence. In regard to structural requirements for the prevention of fire, the L.C.C. has power under the London County Council (General Powers) Act, 1915, to revoke music and dancing licences if the terms or conditions on which they were granted are contravened, and under a similarly entitled Act of 1923, the council may vary the conditions attached to licences for stage plays granted by it under the provisions of the Disorderly Houses Act, 1751, the Cinematograph Act, 1909, or any amending Act. The enforcement of fire regulations is also provided for under the London County Council (General Powers) Act, 1923, and, in the metropolis, the council can close theatres for breach of the regulations. Provision is now made for compulsory registration of theatrical employers under the Theatrical Employers Registration Act, 1925, the object of which Act is to prevent persons of no substance from engaging companies and then abandoning them or failing to pay their salaries. All theatrical employers must hold a certificate of registration issued by the appropriate authority, which is the co. or bor. council or, for the metropolis, the common council. The Act does not apply to an employer or his agent having a licence under the Theatres Act, 1843, or a music and dancing licence; or to persons who employ for charitable performances, and not for gain or by way of business. By an amending Act of 1928 the registration authority can institute and prosecute proceedings against and oppose applications by persons whose certificates have been cancelled; and they can also refuse, cancel, or suspend the registration of a person who has been convicted of an offence involving dishonesty. Places licensed for music and dancing are exempt from the provisions of these 2 Acts. Restrictions are imposed by the Children and Young Persons Act, 1933 (re-enacting analogous provisions of the Education Act, 1921, and the Children (Employment Abroad) Act, 1913, respectively), on children taking part in entertainments, and on the taking of

children or young persons out of the U.K. with a view to their singing, playing, performing, or being exhibited for profit. The proper course where it is proposed to put a child on the stage is to obtain the leave of a magistrate. In Scotland, where the fitness of a child for training is proved, the petty sessional court will grant a licence allowing it to be trained for the stage, provided the court is satisfied that provision has been made to secure kind treatment. Dramatic and musical performances are protected by the Musical Performers' Protection Act, which prohibits unauthorised persons from making records (i.e. any mechanical contrivance for reproducing by sound) of any such performances; but it is a good defence to prove that the record was not made for purposes of trade. *See also* CENSORSHIP OF THE DRAMA; MUSIC AND DANCING LICENCES. *See* Ivamy, *Show Business and the Law*, 1956.

Thebaine ($C_{10}H_{11}NO_2$), one of the alkaloids contained in opium (q.v.) in combination with meconic acid. It is very poisonous, causing severe convulsions. It gives a blood-red coloration with concentrated sulphuric acid.

Theban Legion, **The**, legion of the Emperor Maximilian Hercules, which consisted of Christians recruited in Upper Egypt. Traditionally the entire legion was massacred in 287 when its members refused to take part in the pagan sacrifices prepared by Maximilian at Agaunum, Switzerland, before engaging in battle. The names of some of the legionaries are known. A basilica was built at Agaunum (St-Maurice-en-Valais) in the 4th cent. to enshrine the martyrs' relics. Some authorities question whether the whole legion was massacred. The feast of the T. L. is celebrated on 22 Sept.

Thebes (Gk *Thebai*, Egyptian *Wast*, later *Ne* 'the city,' sometimes *Ne-Aman* hence biblical *No-Amon*, 'the city of Amon'): 1. Name of anct city of Upper Egypt, known latterly as Thebais; surviving to-day in the magnificent ruins of Karnak and Luxor, which mostly date from the New Kingdom, when it was the cap. It rose into prominence under the princes who as the 11th dynasty reunited Egypt, one of whom, Mentuhotep III, has left a fine funerary temple at Deir el Bahri on the W. bank. T. was particularly developed by the 18th dynasty, who enriched the whole area with monuments and began the long series of royal tombs in the Valley of the Kings behind Deir el Bahri, where Hatshepsut built her graceful funerary temple alongside that of Mentuhotep III, and Amenhotep III built his farther S., of which only the Colossi of Memnon survive; at Medinet Habu, farther S. still, he constructed a palace and great lake for his queen Tiy.

Thebes was the centre of worship of Amen-Ra, with his consort Mut the vulture mother-goddess and their son Khons. Each king added to the great temple of Amen at Karnak, and the priests of Amen became excessively rich and powerful. They suffered a temporary setback under Akhnaton (q.v.), but under

the 19th dynasty the architectural magnificence of Thebes increased. Seti I and Rameses II built great additions to the temples of Karnak and Luxor, and funerary temples on the W. bank. Rameses III built a temple and tower at Medinet Habu. The 25th dynasty made T. their capital, but under them it was sacked by the Assyrians. Homer describes T. as



André Roos

THEBES, UPPER EGYPT

Temple reliefs at Medinet Habu of Rameses III (1198-1167 BC: 20th dynasty) making offerings to Amen-Ra.

'hundred-gated' referring to the monuments.

Under the Ptolemies, it ceased to be the capital of Upper Egypt, but as always it was liable to be the centre of nationalist movements. It was severely punished after a rising in 86 BC by Ptolemy VII and destroyed in the reign of Augustus for another rising.

See also EGYPT, *History*.

2. Chief city of Boeotia in anct Greece and bp. of Pindar. Its position was well defended, since it was situated in the middle of a plain surrounded by mts. No city is more famous in the mythical ages of Greece than T. It was here that the

use of letters was introduced from Phoenicia. T. was the traditional bp. of Dionysus and Heracles and the native city of Tiresias the soothsayer and of Amphion the musician. It was also the scene of the tragic fate of Oedipus, and of the war of the Seven against Thebes. Soon afterwards, the Epigoni or descendants of the 7, marched against T. to avenge their fathers' death, captured the city, and destroyed it. The first historical trace of the city is found in the conquest by the Boeotians about the year 1100 bc. T. then became the chief city of a confederation. She became the closest ally of the Spartans, and during the Peloponnesian war was Athens' bitterest foe. At the close of the war, however, she allied with Athens against Sparta, but the city was conquered and garrisoned by the Spartans. After the battle of Leuctra (371 bc) for a short time she became, under Epaminondas, the most powerful state in Greece; but with the death of Epaminondas at the battle of Mantinea, 362, T. lost her newly won supremacy. She was defeated and captured by the Macedonians, and utterly destroyed, with the exception of the temples and Pindar's house, by Alexander the Great (336 or 335 bc). The tn was restored in 316 bc.

Thecla, Saint, Gk saint of the Christian Church, who lived in the 1st cent. The *Acts of Paul and Thecla*, which was written in the 2nd cent. and is often untrustworthy, describes her as a member of a noble family in Iconium, in Lycaonia, who was converted by the preaching of St Paul. She is said to have followed him, dressed in boy's clothes, and to have suffered many cruel tortures for her faith. St T. is said to have died in Seleucia. Though the story seems to have a factual basis, it appears to have become much embellished. Her feast-day is on 23 Sept.

Thecodonts, small, lizard-like, bipedal Triassic reptiles with sharp teeth set in sockets, which were probably the ancestors of the more advanced archosaurs or ruling reptiles (dinosaurs, pterosaurs, crocodiles).

Theft. In most communities, ancient and modern, the institution of private property has occasioned the formulation of copious laws for the redress of violations by T. of the exclusive rights of ownership. But in an age of ungoverned violence, when legislators or law-givers had not as yet attained to the conception of the preservation of public order for its own sake, the legal code of an ancient state reflected a very different view of the moral aspect of stealing from the modern view, or even from that of the earliest Christianised communities. Maine asserts with a great show of probability that the ancient Roman and Gk codes had no real law of crimes at all, and that such penal laws as they do reveal are no more than the law of wrongs or torts (see TORT). The first civil wrong recognised by the Twelve Tables was that of *furtum* (T.), and even assaults and violent robbery were no more than *delicta* (torts). All such wrongs gave rise to an *obligation* or *vinculum juris*, the fulfilment

of which was considered complete with the payment of money. T. is defined in the *Institutes* of Justinian as 'the fraudulent dealing (*contredatio rei fraudulosa*) with a thing itself, or with its use, or its possession; an act which is prohibited by natural law.' This definition affords some striking points of resemblance to most modern definitions of stealing (cf. that of larceny in Eng. law, under LARCENY). Though, whether by reason of the influence of Christian ideas or the attainment of a more subtle analysis of motive, the text of the *Institutes* continues: 'A person, however, who borrows a thing and applies it to a purpose other than that for which it was lent, only commits theft if he knows he is acting against the wishes of the owner . . . for there is no theft without the intention to commit theft.' In England the doctrine of the King's Peace was the foundation of T. as a public wrong; on the Continent it is to be traced to the source of *Naturrecht* or Natural Law (see JURISPRUDENCE and *JUS GENTIUM*). The A.-S. laws of Ina, Athelstan, and others respecting the punishment of T. reveal a curious compromise between the Draconian severity of a pagan state and the mildness inculcated by the Christian missions from Rome; death was nominally the punishment in cases of T. where the value of the article taken exceeded 12d.; but in practice the thief could always compound his offence by a fine. Up to comparatively recent times, however, felonious T. remained a cap. offence (see CAPITAL PUNISHMENT). At the present time T. connotes a variety of cognate but distinct offences, varying from larceny (q.v.) to fraudulent breach of trust. See also BURGLARY; EMBEZZLEMENT; FRAUD; LARCENY.

Thogn, see THANE.

Thelne, see CAFFEINE.

Theism, see DEISM; MONOTHEISM; PANTHEISM; POLYTHEISM; RELIGION; THEOLOGY.

Thells, see TISZA.

Thellusson, Peter (1737-97), Brit. merchant, b. Paris, son of the envoy of Geneva; he settled in London and became naturalised. He amassed a great fortune, and his son, Peter Isaac, was created Baron Rendlesham (1806). His name is remembered for his eccentric will, the harsh provisions of which led to the passing of what is known as the Thellusson Act (1800). By his will T. directed the income of his property to be accumulated during the lives of all his children, grand- and great-grandchildren, who were living at the time of his death, for the benefit of some future descendants to be living at the decease of the survivor, thus keeping within the letter of the rule of perpetuities which allowed any number of existing lives to be taken as the period for an executory interest (see EXECUTORY). For the provisions of the Thellusson Act, see ACCUMULATION. See also PERPETUITY.

Thelypteris, family Polypodiaceae, a rhizomatous genus of about 500 species, cosmopolitan, with 2 deeply, pinnatifid cut leaves. *T. dryopteris*, Oak Fern, T.

phaeoptis, Beech F., *T. palustris*, Marsh F., *T. robertiana*, Limestone F., and *T. oreopteris*, Mountain F., are all native to Britain; sometimes placed under *Dryopteris*.

Theme, in music, prin. melodic feature in a composition, differing from a subject by greater length and more self-contained completeness, a subject being usually susceptible to development, e.g. in a fugue or sonata-form work, whereas, a T. may be said more often to undergo restatement or decorative elaboration, especially in varied form. Sets of variations are always based on a T.

Themis, daughter of Uranus and Gaea, and by Zeus mother of Eunomia, Dike, and Irene; the personification of law and order who presided over the oracle at Delphi before Apollo.

Themistius (c. AD 317-388), Gk philosopher and rhetorician, was a native of Paphlagonia. He settled in Constantinople about 345, where he became a senator (355) and prefect (383). He wrote 34 speeches, and paraphrases of various works of Aristotle. The *editio princeps* is that of Aldus (Venice, 1534). There is an ed. of the *Orations* by W. Dindorf, 1832, and of the *Paraphrases* by M. Wallies and others in *Commentaria in Aristotelem Graeca*, 1903. See L. Méridier, *Le philosophe Themistius devant l'opinion de ses contemporains*, 1906.

Themistocles (c. 528-462 BC), Athenian soldier and statesman. He was always ambitious, and began his career by setting himself in opposition to those who had most power, and especially to Aristides, to whose ostracism (483) he contributed. From this time he was the political leader in Athens. T. advocated naval expenditure to protect Athens from Persian invasion, and through his influence 100 new triremes were constructed and the port moved from Phalerum to Piraeus. It was T. who forced the naval engagement at Artemisium and was responsible for the Gk victory at Salamis (480). On the retirement of the Persians, he rebuilt the walls of Athens and strengthened the fortress and harbour of Piraeus. He also removed the *metoikion*, an alien's tax, and thus encouraged many foreign traders to settle in Athens. He appears to have gradually lost his influence with the Athenians soon after the Persian defeat, probably on account of his arrogant manners, and about 471 was accused of peculation (possibly justly), ostracised, and banished from Athens. He retired to Argos, and when accused of treason fled to Corcyra, and finally was welcomed by Artaxerxes. He settled in Magnesia, where he lived till his death. See lives by Plutarch and Cornelius Nepos, and G. B. Grundy, *The Great Persian War*, 1901.

Theobald (d. 1161), archbishop, b. near Thieèveville, Normandy, studied law under Lanfranc at Bec. In 1138 he was nominated Archbishop of Canterbury by Stephen. It was probably at his instigation that the Pope refused to give his permission to T. to crown Stephen's son Eustace as King of England (1152). Under T. the Church became more

powerful; though he had crowned Stephen, he was ready to resist him whenever he felt the power of the Church threatened. He was one of a select body of experienced Eng. advisers who were appointed by Henry II soon after his coronation as justiciars, and introduced the study of civil law into England.

Theobald, Lewis (1688-1744), critic and translator, b. Sittingbourne. He became an attorney, but turned to literature, made trans. from the Greek, and wrote essays and poems. His *Shakespeare Restored*, 1715, severely criticised Pope's ed., and T. was rewarded with the first place in Pope's satire, the *Dunciad*. T.'s own ed. of Shakespeare, pub. in 1734, has many valuable emendations. See life by R. F. Jones, 1919.

Theobalds Park, Herts, England, near Cheshunt, 12 m. from London. The park takes its name from Theobald's Palace, built by Lord Bureleigh in the 16th cent.; James I lived for a time in the palace, and d. there in 1625. The house was pulled down c. 1765 and a second one built. Temple Bar (q.v.), moved from Fleet Street, London, in 1878, stands in the park. The house, formerly the property of the Meux family, is now a Middx co. secondary school.

Theocracy (Gk *theokratia*, government by God), a term applied to the constitution of the Israelitish government as established by Moses, on account of its being under the direct control of Jehovah. This constitution underwent modification with the election of Saul as king, and with the subsequent choice of David, the king 'after God's own heart,' Israel became a theocratic monarchy: the king was considered as mediator between God and his people (II Sam. xxiv. 17). In the books of the Maccabees the concept of God's personal gov. is less apparent (see, however, I Macc. iv. 20).

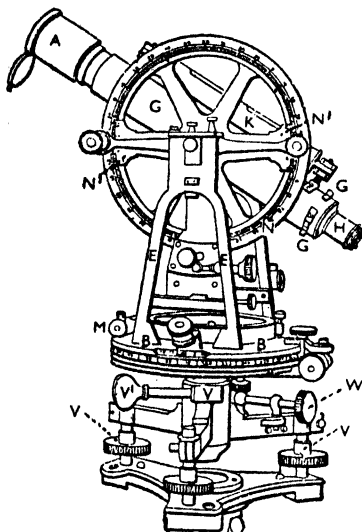
Theocritus (b. c. 310 BC), Gk pastoral poet, was a native of Syracuse, and the son of Praxagoras and Philinna. Having studied under Philetas in Cos, he visited Alexandria and obtained the patronage of Ptolemy Philadelphus, in whose praise he wrote the 14th, 15th, and 17th Idylls. T. was the creator of bucolic poetry as a branch of Gk, and, through imitators such as Virgil, of Rom. literature. The bucolic idylls of T., 30 of which are extant, are of a dramatic and mimetic character, and are pictures of the ordinary life of the common people of Sicily. He also wrote epic poems. The best editions are those of U. von Willamowitz-Moellendorf, *Bucolici Graeci*, 1910, and A. S. F. Gow, *Theocritus with trans. and commentary* (3 vols.) 2nd. ed., 1952.

Theodectes (c. 376-335 BC), Gk orator and tragic poet b. Phaselis. His father Aristander caused him to study under Plato, Isocrates, and possibly Aristotle, who dedicated to him one of his treatises on rhetoric. T. also wrote sev. orations and poems on the art of oratory.

Theodicy (*theodike*), etymologically the justice of God. Our present application of the term is due to Leibnitz (q.v.), who pub. in 1710 his *Essai de Theodicée sur la*

Conté de Dieu, la liberté de l'homme et l'origine du mal, a defence of the justice of God and investigation of the problem of evil. A sub-division of Natural Theology (q.v.) it follows logically from the treatise on the existence and nature of God.

Theodolite, instrument for measuring horizontal and vertical angles, used extensively in surveying. A telescope, giving the line of sight, is mounted on a horizontal axis (at right angles to the



THEODOLITE

The illustration shows one form of Theodolite resting on its levelling screws on a tripod.

A, object-glass and cap; B, upper plate or limb; E, supporting limbs of telescope, etc.; G, body of telescope, and diaphragm; H, eyepiece; K, spirit-level on telescope; M, microscope for vernier; N, verniers; V, levelling-screws; V', and W, slow-motion clamping-screw.

optical axis) fixed in a frame whose vertical axis passes through the centre of a horizontal graduated circle. The telescope can swing in a vertical plane around the horizontal axis, the angle of rotation being measured on a vertical graduated circle. The frame with telescope can rotate about the vertical axis, the movement being measured by 2 diametrically opposite indexes with micro-meters. Modern T.s are of the transit type, in which the telescope can make a complete rotation about the horizontal axis reversing the line of sight. A plumb line is attached to the vertical axis for accurate centring of the T. above the point from which angles are to be measured.

Some T.s have a special centring arrangement independent of the tripod. A circular level on the tripod serves preliminary levelling, the horizontal plate has 2 levels at right angles, 1 in the line of sight; a level is placed on the telescope and sometimes a 'striking level' on the horizontal axis. The graduated scales are now mostly of glass, and images of opposite parts of the horizontal scale are brought under a single microscope by a system of prisms.

Theodor von Neuhoff, see NEUHOFF, THEODOR VON.

Theodora (c. AD 508-547), wife of the Byzantine emperor Justinian I, notorious before her marriage as an actress and dancer of ill-repute, was proclaimed empress in 527. She showed great courage in the Nika insurrection (532), and was an able counsellor in all matters of State. Her character suffered no taint after her marriage, and indeed posterity might have known nothing derogatory to her but for the *Secret History* of Procopius, whose other writings extolled Justinian and his Empress. There is no hint of her profligacy in other writers. See A. Débidur, *L'impératrice Theodora: Etude critique*, 1885, which is a refutation of Procopius. T. is the subject of a play by Sardou, produced in Paris, 1884. See also W. G. Holmes *The Age of Justinian and Theodora*, 1912.

Theodore, name of three Russian tsars, see FEDOR.

Theodore of Canterbury, St (c. 602-690), b. Tarsus, Cilicia. He spent some time at Athens and became a monk at Rome. At the age of 66 he was appointed by Pope St Vitalian to the see of Canterbury at the suggestion of the African St Adrian, who accompanied him to England and acted as his adviser. T. has been rightly called the second founder of the see of Canterbury and the first primate of the Eng. church. He travelled extensively over the country, promoted learning, opened schools, consolidated or re-established dioceses, and held the first national council in 673 at Hertford. His activities involved him in disputes with St Chad and St Wilfrid on questions of jurisdiction, but these controversies were amicably settled. St T. has a strong claim to be considered as a prominent figure in Eng. hist. See lives by O. Fritzsche, 1847; H. B. Swete, 1880-2; A. Mai, 1832, 1854; E. Sachau, 1869.

Theodore of Ethiopia, see ETHIOPIA.

Theodore of Mopsuestia (c. 350-428), bishop, b. Antioch, a friend of St John Chrysostom, who converted him to the ascetic life. Ordained in 383, he was a great preacher and exegete, and became Bishop of Mopsuestia in Cilicia c. 392. He was a voluminous writer, and opposed St Augustine's teaching on original sin. He was attacked after his death for encouraging, by his writing, the heresies of Pelagius and Nestorius, and some of his works were condemned at the 5th Synod of Constantinople, in 553, with the reluctant assent later of Pope Vigilius. See L. Patterson, *Theodore of Mopsuestia and Modern Thought*, 1926.

Theodoretus, or **Theodoret** (c. 393-457), Syrian bishop and theologian. Trained by Theodore of Mopsuestia and St John Chrysostom (qq.v.), he became a deacon at Antioch, and in 423 Bishop of Cyrus. He was so successful against the heretic Marcionites (q.v.) that he claimed to have baptised 10,000 of them. He protested against the condemnation of Nestorius (q.v.), a friend of his student days, by the Council of Ephesus (432), and was deposed and retired to a monastery (449). But at the Council of Chalcedon (451) he submitted and was re-instated. T. wrote an immense number of works, among them a *History of the Church from 329 to 429*, an *Apology for Christianity*, and a *Concise History of Heresies*. See G. Bardy, 'Théodoret,' *Dictionnaire de Théologie Catholique* (Vacant-Mangenot), 1946.

Theodoric (or **Theoderic**) I, King of the Visigoths (AD 418-51), and son of Alaric I. He succeeded Wallia, and fought the Romans from 425 to 440, defeating them at Toulouse (439), soon afterwards concluding peace with them. Then, joining with Aetius, the Rom. general, against Attila the Hun (450), he was killed in the battle of Châlons (451). **Theodoric II**, his second son, became King of the Visigoths (452-66), after murdering the elder, Thorismond, and ruled over most of Spain and Gaul. He was assassinated by his brother Euric.

Theodoric the Great (c. 455-526), founder of the Ostrogothic monarchy in Italy, b. Pannonia. As a child he was sent as a hostage to Constantinople, and soon after his return to his father, Theodemir, attacked the King of the Sarmatians and captured Singidunum (Belgrade). Theodemir and his son then successfully invaded Moesia and Macedonia, and on Theodemir's death (c. 474), T., after some raids against the emperor Zeno and a rival Gothic chieftain, set out to win Italy from Odoacer, whom he defeated at Verona and then besieged in Ravenna. After the capitulation, T. violated the terms by killing Odoacer (493). T.'s 33 years' reign was a period of peace and prosperity for Italy such as it had not known for cents. He maintained his traditional Arian creed, but was tolerant in religious matters. His closing years were sullied with the judicial murders of Boethius (q.v.) and the latter's father-in-law Symmachus. He figures in the *Nibelungenlied*, being known to the Germans as Dietrich of Berne (Verona). See T. Hodgkin, *Theodoric the Goth*, 1891, 1923; M. Brion, *Theodoric, Roi des Ostrogoths*, 1936; G. Vetter, *Die Ostgoten und Theoderich*, 1938.

Theodosia, see **FEODOSIYA**.

Theodosius, Rom. gen. of the reign of Valentinian I. He fought against the barbarians of Britain and Germany (367), and crushed a Moorish insurrection in Africa (373). The reason of his execution at Carthage (376) is unknown. His son was the emperor Theodosius the Great.

Theodosius I, Flavius, the Great (c. 346-395), E. Rom. emperor, b. in Spain, son of Theodosius, the gen. of Valentinian I.

He became emperor of the E. in 378 at the invitation of Gratian. T. warred successfully against the Goths, and by skilful diplomacy enlisted 40,000 of them as his allies (382). In 388 he defeated the usurper Maximus at Aquileia, and secured the W. throne for Valentinian II, brother of Gratian. After Valentinian's death (392) T. marched against another usurper, Eugenius, whom he defeated near the Frigidus (394), and became sole emperor. After a few months, however, he d. at Milan, and the empire was divided between his 2 sons, Honorius and Arcadius, the former ruling the W., the latter the E. T. was responsible in 390 for the famous massacre at Thessalonica. He did his utmost to countermand the order, but his messengers were too late; and St Ambrose compelled him to do public penance before admitting him to the cathedral at Milan. See T. Hodgkin, *The Empire of Theodosius*, 1889.

Theodosius II (401-50), grandson of T. the Great, and son of Arcadius, succeeding him as emperor of the E. (408). His sister Pulcheria and the praetorian prefect, Anthemius, ruled during his minority. Wars with the Persians (421 and 441) and the Huns under Attila (441-8) were among the chief events of his reign. The *Codex Theodosianus*, in 16 books, was pub. in 438. See J. B. Bury, *Later Roman Empire*, vol. I, 1923.

Theognis of Megara (late 6th cent. bc), Gk elegiac poet and reputed author of a collection of political verses strongly aristocratic in temper. See the edition with commentary by T. H. Williams, 1910; C. M. Bowra, *Early Greek Elegists*, 1938.

Theogony (Gk *theos*, god; *gonos*, seed), genealogy of the gods. Many early Gk poets wrote verse theogonies. Only that of Hesiod (q.v.) is extant.

Theology (Gk *theos*, god; *logos*, science), science of religion, dealing therefore with God, and man in his relations to God. Systematic T. deals with the specific doctrines, principles, and characteristics, e.g. of Christianity. T. is treated under 2 main heads, Natural and Revealed T.; but various causes, especially the application of the theory of evolution to religion and T., gave rise to a Broad or Modernist school of thought, which sought to do away with hard-and-fast divisions. In T., as elsewhere, it minimised the importance or denied the existence of critical points in the world's hist., and traced instead an orderly development. Without an entire break with historic Christianity, no such change can take place with regard to dogmatic T., and modernist T. did not shrink from a drastic modification of the Creeds.

There is a very close affinity between T. and philosophy. While philosophy seeks Being, the ultimate reality underlying phenomena, T. seeks the knowledge of the supreme Being, God in Himself, and in the light of that knowledge of the creature's relation to Him.

Catholic T. of all ages takes its stand upon a divine revelation from without the human mind, though insisting that certain

revealed truths, such as the existence of God, are also within the reach of natural reason and so form part of natural as well as Revealed T. Revealed T. may be analysed according either to its matter or to its method. The division according to its matter gives us the 2 branches of *Fundamental*, and of *Dogmatic Theology* (q.v.); the former concerned with the grounds upon which Revealed T. and religion rest, the Fact of Revelation, the Founts of Revelation, and the way in which it is received; the latter, dealing with the truths so revealed, falls into 2 branches, theoretical (Dogmatic Theology proper) and practical (Moral Theology, q.v.). The division according to method gives us *Positive* and *Speculative T.* *Positive T.* seeks to establish, expound, and prove the truths of T.; and is further divided into *Biblical T.* (if it is concerned only with Scriptural sources and proofs), *Patristic T.* (if it draws only upon the Fathers), and *Symbolic T.* (which confines its scope to the creeds and formularies of the Church). Akin to these (as also to Fundamental T.) are also *Polemic* or *Apologetic T.*, which seek to defend and to commend theological doctrine in a hostile, sceptical world. *Speculative T.* makes use of Philosophy and other rational inquiries to probe more fully into the nature and implications of the truths of religion.

Essential to the study of T. is exegesis, the submission of the Scriptures to the Lower and Higher Criticism, and from this follows *Historical T.*, the study of Christian doctrine as it has manifested itself in the hist. of the Church from the formative or Patristic period to the present day. The philosophy of religion, with which Natural T. (q.v.) is now identified, concerns itself with the study of the idea of God, the freedom of God, and the operation of Grace, and finally the nature of immortality, which is also the subject of eschatology (q.v.). The philosophy of religion, which also embraces comparative religion, and the psychology of religion, reached its modern scientific forms only since the Renaissance. It has divided into 2 main streams: the traditional, founded on revelation as it exists in the Scriptures, and the empirical, which, though recognising the Scriptures as the source of doctrine, argues the existence of God from the nature of man. In the 19th cent., mainly through the influence of Hegel, Schleiermacher (qq.v.), and Otto, this subjective view of T. held sway among Protestants. In more recent times they have shown a marked swing away from the importance attached to the religious experiences of man and a return to the importance of revelation in the Word of God. This movement is associated particularly with the work of Karl Barth and Emil Brunner, and was clearly seen in the Ecumenical Council of Churches at Amsterdam in 1948. See also *BIBLE*; *FAITH*; *RELIGION*. See H. R. Mackintosh, *Types of Modern Theology*, 1937; K. E. Kirk (ed.), *The Study of Theology*, 1939; C. Van Til, *New Modernism*, 1948; E. Brunner, *Christianity and*

Civilisation, 1947; W. R. Matthews *God in Christian Thought and Experience* (7th ed.), 1947; A. Vidler, *The Theology of F. D. Maurice*, 1949; and C. Dawson, *Religion and Culture*, 1949.

Theophrastus (c. 370-c. 286 BC), Gk philosopher, b. Eresos in Lesbos. Though he had begun to study at Athens before the death of Plato (347 BC), he soon afterwards joined Aristotle (q.v.) at Assos and Mitylene. He became the Stagirite's most able pupil and succeeded him as head of the Peripatetic school in 322 BC. From that time until his death he laboured to consolidate and expand the work of his master, a task which he fulfilled with great success. A close follower of Aristotle's thought and method, he gave particular attention to natural science and botany. His surviving works include *The History of Plants* and *The Causes of Plants* (ed. and trans. by Sir A. F. Hort, 2 vols. Loeb Library), 1916, *From the Metaphysics* (ed. and trans. by W. D. Ross and F. H. Forbes), 1929, and a most readable book entitled *Ethical Characters*, a collection of typical 'bad hats' (ed. and trans. by J. M. Edmonds, Loeb Library), 1929. The fullest account of T. and his work is to be found in O. Regenbogen's article, in Pauly-Wissowa, *Realencyclopädie*, supp. vol. vii, 1950. See also E. Zeller, *Aristotle and the Earlier Peripatetics*, 1897.

Theorbo, obsolete instrument of the lute type, actually a kind of bass lute of large size with a double neck on which only the upper strings are stretched over a finger-board, the bass strings being at the side of it and not capable of producing different notes, except by retuning. The T. came originally from Padua, but there were other examples, including the Eng. one also called Archlute. The It. Chitarone was a similar instrument, but originated in Rome. The number of strings varied from about 11 to 17. The T. was much used in the 17th cent.

Theorem (Gk *theôrēma*, something to be looked at or seen), in mathematics, any proposition which states its conclusion, or makes some affirmation or negation requiring proof, whereas a problem states something which is to be done.

Theory, properly speaking, the mode of making seen and known the dependence of truths upon one another, or a supposition explaining something, especially one based on principles independent of phenomena to be explained. T. is popularly opposed, on the one hand, to fact and, on the other, to practice, but the opposition is not essentially valid, and arises from the imperfection of T.s which cannot be reconciled with the data of experience certain or assumed. The distinction between theoretical and practical labourers in the field of science or art is not strictly a just one, for there is no theorist whose knowledge is based wholly on T., and there is no practical man whose skill is all derived from experience.

Theosophy (Gk *theos*, god; *sophia*, wisdom) claims a high antiquity, coming down from the Neoplatonists, Plotinus,

Iamblichus, and Proclus. It may be defined as a syncretistic religion professing to afford a higher knowledge or more immediate approach to God than is offered by any single religion based on revelation or reason.

Theosophists claim to include in their ranks Paracelsus, Boehme, and the Rosicrucians, and to be of ancient oriental origin, the Sanskrit equivalent being *Brahma-Vidyā*, or divine knowledge. It is based to some extent on oriental mysticism, and is pantheistic in its theology, believing in one absolute, incomprehensible, and supreme deity, who is the root of all nature, and of all that is visible and invisible, and in man's eternal nature, which, being a radiation of the universal soul, is of an identical essence with it, and teaching that by returning to the purity of nature, one can gain certain occult powers. Helena Petrovna Blavatsky (q.v.) (1831-91), a Russian princess, who it is claimed was initiated in Tibet, is the recognised founder of the 2 great branches of to-day. T. is supposed to be preserved by initiates scattered over the world who have attained spiritual perfection, but elect to watch over religion, which they hope to unify under 1 system of ethics. A group of these Arhats, Mahatmas, or Masters, it is said, led Helena Blavatsky to found the Theosophical Society in 1875. Its teachings in general may be said to be founded on the 2 great principles of 'Karma' (q.v.) and Reincarnation (q.v.), or the belief that man must undergo a series of lives until he has assimilated all the soul-experiences and can attain to Nirvana (q.v.). The terminology and the thoughts are derived from Hinduism and Buddhism (q.v.), but T. claims to be distinct from either. After Helena Blavatsky d., W. G. Judge, of America, became the leader, and upon his death the society split into 2 sections, 1 following Katherine Tingley, and the other Annie Besant. See Helena Blavatsky, *Isis Unveiled*, 1877, *The Secret Doctrine*, 1888, and *The Key to Theosophy*, 1889; Annie Besant, *Theosophy and the New Psychology*, 1904. See also KRISHNAMURTI; BLAVATSKY.

Theotocopuli, Domenico, called **El Greco** (1541-1614), Gracco-Sp. painter, b. Phodele, near Candia, Crete, then a Venetian possession. He began painting in the style of the Cretan icon-makers, but then studied in Venice under Titian. The Venetian school, and especially the impassioned movement of Tintoretto's works, moulded his development. He was in Rome 1570-c. 1576, when he migrated to Toledo. In that city, where he lived the rest of his life, he painted for the cathedral the picture 'El Espolio' (the Stripping of Christ) (1579). His masterpiece, one of the world's greatest pictures, 'The Burial of Count Orgaz,' was painted probably in 1587, for S. Tomé, Toledo. T.'s stormy and mystical paintings, especially his religious works, with their foreshortened or strangely elongated figures, vehemently express his spiritual intentions. He reduced his palette to 5 colours, yet believed that colour was more

important than design and used those few pigments to intense dramatic effect. Many of his portrait works are in the Prado, Madrid. He is represented in the National Gallery, London, notably by a version of his 'Christ Driving the Traders from the Temple,' and 'Christ on the Mount of Olives.' His single but immensely impressive landscape 'View of Toledo' is in the Metropolitan Museum, New York. See Manuel B. Cossio's various works on T., especially *El Greco*, 1908; and studies by A. F. Calvert and C. G. Hartley, 1909; A. Meyer, 1911; M. Barrés, 1911 and H. Kehler, 1914; Elizabeth du Gue Trapièr, 1925; F. Rutten, 1930; M. Legendre and A. Hartmann, 1937; L. Goldscheider, 1938. See also SPANISH ART.

Thera, or **Santorin**, Gk is. in the Aegean Sea (q.v.), the most southerly of the Cyclades group, and lying about 60 m. N. of Crete. Its steep shores vary in height from 500 to 1200 ft. The entire N. half is composed of volcanic material, and from the earliest times the is. has been a centre of volcanic agency. The coast-line is some 30 m. long, and opposite the inner or W. curve lies the smaller is. of Therasia. T. and the neighbouring islets are the remnants of a submerged volcano which last erupted in 1925-6. Both T. and Therasia have yielded interesting archaeological discoveries in the form of prehistoric dwellings with antique vases and carefully worked stone instruments. According to Herodotus, Cadmus estab. a Phoenician colony in T. The vils. are built along the edge of the cliffs, which are striking for their black lava tufa and other volcanic strata, much of which is deep red in colour. The cap. T. (pronounced Phera) is a mere vil. The is. produces some cereals, such as barley, as well as figs and olives, but vines are the chief crop. Pop. 9700.

Theramenes, son of Hagnon, a leading member of the Athenian oligarchical gov. of the Four Hundred (411 BC). Subsequently he not only helped to depose the Four Hundred, but was instrumental in securing the condemnation of Antiphon (q.v.) and Archeptolemus. After the capture of Athens by Lysander (404 T.) was chosen one of the Thirty Tyrants, one of whom, Critias, afterwards accused him of treason, and he was put to death.

Therapeutics, Therapeusis, or **Therapy**, that branch of the science of medicine which deals with the treatment of disease, and the application of remedies. Remedial agencies are divided into classes, according to general similarity of treatment, e.g. aërotherapeutics (q.v.), balneotherapeutics (q.v.), electrotherapeutics, occupational therapy (q.v.), psychotherapeutics, physiotherapy (q.v.), serum therapeutics (q.v.), vaccine therapeutics (q.v.), hydrotherapeutics or hydropathy (q.v.), thermotherapeutics (by the use of drugs), etc.

Therapnae, tn in Laconia, on the Eurotas, near Sparta, celebrated in Gk mythology as the bp. of Castor and Pollux. Menelaus and Helen were said to be buried here.

Therapsids, mammal-like reptiles of Permo-Triassic age from the Karroo beds of S. Africa. They display radiation into sev. varied groups, and gave rise to the mammals.

Theresa, St. of Avila, see TERESA, ST.

Thérèse, St. (1873-97), St. Teresa of Lisieux, 'The Little Flower,' Fr. Carmelite nun, b. Alençon, the ninth child of Louis and Zélie Martin. The family moved to Lisieux and at 15 she became Sister Teresa of the Child Jesus in the Carmel there, where she remained until her death. Her autobiography was written under obedience 1894-7, and was not seen outside the convent until after her death. Its publication evoked a world-wide wave of acclamation, and the shower of miracles immediately following her death led to her canonisation in 1925 (commemorated 3 Oct.). Her 'little way' lived under ever-increasing suffering, teaches the way of 'spiritual childhood,' and she has become the St. of the ordinary man and woman in their daily lives in the world and the patroness of all priests, especially in the mission field, in their vocation of winning souls for Christ. See *The Story of a Soul* (the autobiography of St. Thérèse of Lisieux) and numerous biographies and studies, including H. Petitot, *Saint Teresa of Lisieux: A Spiritual Renaissance*, 1948; M. M. Phillipon, *The Message of Thérèse of Lisieux*, 1950; and *Autobiography of a Saint* (trans. R. A. Knox), 1958.

Therm, statutory unit of heat, on the basis of which coal-gas is bought and sold. It is equal to 100,000 Brit. Thermal Units (B.Th.U.), and the latter unit is defined as the amount of heat required to raise the temp. of 1 lb. of water through 1° F. (from 60° to 61° F.), and equals 251.9 calories (q.v.). See PHYSICAL CONSTANTS.

Thermae, huge buildings erected by the Rom. emperors, and comprising not only baths of various kinds but often libraries, gymnasia, theatres, etc., also. The *tepidarium* was a warm room, with no bath, in which the bather usually spent some time before undressing. The apartment for undressing was the *apodyterium*; the *frigidarium* contained a cold bath, and the *caldarium* contained warm baths. The prin. surviving ruins of T. in Rome were built by Caracalla, c. AD 215, and by Diocletian, AD 306 (converted by Michelangelo, q.v., into the church of Santa Maria degli Angeli). Others were erected by Agrippa, 25-12 BC, and by the emperors Nero, AD 62, Titus, c. 80, Trajan, c. 115, etc. Outside Rome there are interesting remains of Rom. T. at Pompeii in Italy, at Bath and at Wroxeter (Viroconium) in England, near the Musée de Cluny at Paris, and elsewhere.

Thermae Himerenses, see TERMINI IMERESE.

Thermae Selinuntinae, see SOIACCA.

Thermal Unit, see CALORIE; ELECTRICITY; HEAT; THERM.

Thermidor (from Gk *thermē* heat, and *dōron*, gift), eleventh month of Fr. revolutionary calendar. See CALENDAR.

Thermionics and **Thermionic Valve**. T. is the branch of science that deals with the

emission of electrons from matter under the influence of heat. Following the identification of the electron by J. J. Thomson in the closing years of the 19th cent., O. W. Richardson discovered the law connecting the emission of electrons from a body with its temp. This emission can be considered as an evaporation of electrons from the body, and the rate of the evaporation is a function of the temp. of the body; the higher the temp., the greater the rate of evaporation. The evaporation depends on the nature of the surrounding gas, but Richardson found that in a highly evacuated atmosphere the formula $n = A\sqrt{T}e^{B/T}$ is a fairly accurate representation of the phenomenon: n is the number of electrons emitted per sq. cm. of the surface of the body per sec., T its absolute temp., e the base of Napierian logarithms, and A and B constants, typical of the body. Further investigation by Langmuir led to the discovery that the evaporated electrons form a 'cloud' surrounding the heated body, and that ultimately equilibrium is estab. between the rate of evaporation and the rate of condensation, i.e. the return of the electrons under the electrical repulsion of the electron cloud or 'space-charge.'

The application of the results of Richardson's and Langmuir's researches led to the discovery and subsequent development of modern wireless technique, which depends for its success on the thermionic valve. (See further under VALVES.)

Thermit, or **Thermite**, mixture of finely powdered aluminium and oxide of iron ('hammer scale,' Fe_2O_3), the heat of combustion of which produces a temp. of about 2600° C. It was invented by Vauten of London and utilised for welding by H. Goldschmidt of Essen. (See WELDING.) T. is used in incendiary bombs.

Thermochemistry, science founded on the law of the conservation of energy, which deals with the thermal effects accompanying chemical actions. Reactions in which heat is evolved are called 'exothermic,' and where heat is absorbed they are termed 'endothermic.' Measurements of the heat of formation of substances, the heat of solution, of combustion, and of the neutralisation of acids and bases, have been determined; also the heat of hydration, the heat of combustion, the heat of ionisation, the heat of dilution, etc. The amount of heat liberated in chemical reaction is determined by allowing it to warm a known quantity of liquid (generally water) whose specific heat is known, and measuring the rise of temp. by means of an accurate thermometer. The water calorimeter generally employed for this purpose consists of an inner platinum vessel surrounded by water contained in an outer vessel of silver, which is protected by poorly conducting material so as to diminish the loss of heat by radiation. The reacting substances, either in the pure state or in solution, are brought to the same temperature and introduced into the inner vessel. The temp. of the

water is taken before and after the reaction, and from the rise of temp., the quantity of water present, and its specific heat (and knowing the water equivalent of the calorimeter) the amount of heat liberated is determined. In order that a reaction may be studied thermochemically it must take place at ordinary temps. and must proceed rapidly to the end. Many reactions which do not fulfil these conditions, such as many processes of combustion, can be made to fulfil them. This is done by causing the substance to be burnt, in the presence of oxygen under increased pressure, in a steel bomb lined with platinum or enamel. Only in a comparatively few cases has it been possible to make direct determinations of the heat value of chemical changes. Thermal values which cannot be determined directly can be calculated indirectly by methods depending on the fundamental principle of T. which was propounded by Hess (*see Hess's Law*). The heat change is dependent only on the initial and final stages of the reaction or system of reaction. Thus the heat of formation of methane cannot be determined directly, but a value may be arrived at by subtracting the heat evolved when methane is burnt from that evolved when the corresponding weights of free carbon and hydrogen are burnt. The unit of heat used in thermochemical measurements is the caloric, or the quantity of heat which is required to raise the temp. of 1 gram of water from 0° to 1° C. The results of measurements are expressed by symbols, which means gram-atomic, or, in the case of compounds, gram-molecular weights of the substances which react. Thus $H_2 + O = H_2O + 68,470$ calories means that 68,470 calories of heat are liberated when 2 grams of hydrogen and 16 grams of oxygen unite at ordinary temp. to form 18 grams of water. If the reacting substances are in solution, the presence of a large quantity of water is denoted by the symbol 'aq'—thus: $KOH_{aq} + HCl_{aq} = KCl_{aq} + 13,700$ calories. Another unit of heat used is 1,000 gram-calories (K).

As well as being of theoretical importance, T. has been found of great value in determining the heating power of fuel for commercial purposes and caloric values of foodstuffs.

Thermodynamics, the science of heat (q.v.) in relation to other forms of energy. At the beginning of the 19th cent. the caloric theory of heat was accepted by scientists generally. According to this theory, heat is a fluid called the caloric which occupies the interstices between the particles of a body. The sum total of the caloric in the universe is constant, and it can neither be created nor destroyed. When a body is heated in a flame caloric passes from the flame into the body, and the exchange increases the temperature of the body and decreases that of the flame. As the weight of a body does not increase when it is heated (assuming chemical changes do not take place), it was evident that the caloric was a weightless fluid. In order to explain the fact that

different substances have different specific heats (q.v.), it was supposed that they possessed different affinities for the heat fluid. A change of state, such as from ice to water, without an accompanying rise of temp. was accounted for on the supposition that there was more room between the particles of water for the caloric, and that a given weight of water therefore contained more caloric than an equal weight of ice. The theory had its uses, and it is interesting to note that the theory of the caloric is implicitly used to-day in the earliest stages of instruction in physics. The first experiment which indicated the falsity of the caloric theory was performed by Count Rumford (*see THOMPSON, SIR BENJAMIN*) in 1798. A quantity of water was placed in a crude calorimeter of gunmetal, and a blunt steel borer pressing on its base was caused to rotate rapidly by means of horse-power; eventually the water boiled, and Rumford demanded to know where the caloric had come from. The calorists gave the unsatisfactory explanation that a small quantity of the gunmetal had been broken up by the borer into fine powder and the caloric had escaped into the water. Rumford was convinced that the caloric theory had been shown to be incorrect and that 'heat is motion.' Nevertheless, the caloric theory held its ground until the researches of Mayer and Joule definitely estab. its falsity in 1849.

The First Law of Thermodynamics. Joule's experiment was essentially as follows. (For diagrams and a fuller discussion, *see HEAT*.) A special calorimeter was fitted with fixed lateral vanes, between which other vanes attached to a vertical spindle could rotate. Round a pulley mounted on this spindle a double cord was wound, to pass from there over 2 pulleys to lead weights hanging freely. The weights descended, and the water inside the calorimeter was churned, and was thereby heated. By a series of careful measurements Joule discovered that the amount of heat produced was always directly proportional to the mechanical work done in rotating the spindle. Furthermore, the constant of proportionality was always the same. The quantitative result of his experiments was that 772 foot-pounds of work expended produce 1 Brit. Thermal Unit of heat (i.e. the quantity required to raise the temperature of 1 lb. of water 1° F.). Joule's quantitative researches confirmed Mayer's qualitative speculations that Heat is a form of Energy. In 1847 Helmholtz read a paper to the Physical Society of Berlin, *Ueber die Erhaltung der Kraft* (On the Conservation of Force), and he is regarded as one of the founders of the law of the Conservation of Energy which was propounded the same year by Joule in a lecture in Manchester, in which he gave 'the first full and clear exposition of the universal conservation of that principle now called energy.' His ideas met with a hostile reception, not only in Manchester, but also from the Brit. Association itself at its meeting in Oxford that year.

Fortunately the attempt made to stifle the discussion of the paper by the illustrious chairman was frustrated by the enthusiasm of a young man in the audience, Wm Thomson, afterwards Lord Kelvin (q.v.), and from that date the real importance of the principle began to be realised. Expressed in simple terms, the First Law of T. states that work and heat are equivalent. It is an excellent example of a physical law, viz. a law that is based on physical measurements and claims to be a law only in so far as it is justified by those measurements. Refined experiments, notably by Callendar and Barnes, and by Reynolds and Moody, have confirmed Joule's conclusions, and the accepted quantitative relation between heat and work is 1 calorie = 4.186×10^7 ergs or 4.186 joules. Expressed mathematically, the law is written $W = H$, where both are expressed in the same units. A conservative preference for retaining the original units leads to the usual expression $W = 4.186 \times 10^7 H$, where W is measured in ergs, and H in calories. The First Law of T. is a *sine qua non* of the Kinetic Theory of Matter that regards heat as the kinetic and potential energy of the molecules of a substance. Further, it was of importance in leading to the recognition that Heat, Light, Electricity, and Sound are all forms of energy.

T., however, had its origin in an attempt by Carnot 'to determine mathematically how much work can be gotten out of a steam-engine.' Carnot's researches were published in 1824, when he still held to the caloric theory. His theories were subsequently modified by Wm Thomson to accord with the dynamical theory of heat as expressed in the First Law of T. Carnot began by considering an ideal heat engine, performing in a manner that enabled him to deduce the relation between the work done by the engine and the heat taken in from the furnace. A modern statement of his principles is as follows: Carnot's engine, Fig. 1, is a

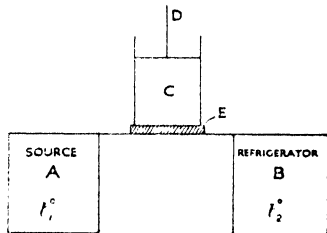


FIG. 1

cylinder C fitted with a frictionless and air-tight piston D. The piston and the sides of the cylinder are supposed to be perfect non-conductors of heat, while the base is a perfect conductor of heat. The cylinder C can be placed either on a non-conducting slab E or in contact with the

source of heat A at temp. t_1° or with the 'refrigerator,' or, as we should say, condenser, receiver, or 'sink,' B at temp. t_2° . The cylinder may contain air or any other working substance under pressure. Fig. 2 is the pressure-volume diagram of the Carnot cycle of operations performed by the engine. The cycle consists of parts of 2 isothermals (q.v.) AB, CD, corresponding to the temps. t_1° , t_2° , and parts of 2 adiabatics (q.v.) AD, BC. The 4 stages

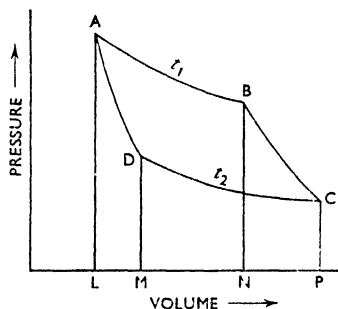


FIG. 2

corresponding to the parts AB, BC, CD, DA, of a complete cycle are as follows: (i) The cylinder is placed in contact with the hot source t_1° and the piston is allowed to rise slowly so that while the working substance expands it takes up heat from the source, so that its temp. remains constant at t_1° . This isothermal expansion is represented by AB on the indicator diagram. (ii) The cylinder is now placed on the non-conducting slab E and the piston is allowed to rise still further. The expansion is adiabatic, i.e. no heat is communicated to or abstracted from the working substance during this expansion, in which the temp. falls from t_1° to t_2° ; the expansion is represented by BC on the indicator diagram. (iii) The cylinder is now placed in contact with the condenser at temperature t_2° and the piston is slowly driven inwards, so that while the working substance is compressed it gives up heat to the condenser and its temp. and that of the condenser remain constant at t_2° . The isothermal compression is represented by CD in the indicator diagram. (iv) The final stage is an adiabatic compression. The cylinder is placed on the non-conducting slab and compressed so that its temp. rises from t_2° to t_1° . The adiabatic compression is represented by DA in the indicator diagram and the cycle of operations is now complete.

We can deduce the efficiency of this engine in the following way. Let Q_1 be the heat absorbed by the working substance while in contact with the hot source during the isothermal expansion AB; let Q_2 be the heat rejected by the working substance to the condenser during the isothermal compression, CD.

The mechanical work done by the engine during one complete cycle is then represented by the area $ABNLA + BCPNB - DCPMD - ADMLA = \text{area } ABCD$. By the First Law of T. this work $W = \text{net heat converted into work}$. Hence $W = Q_1 - Q_2$, since no heat is transferred to or from the substance during the adiabatic changes. The efficiency of an engine being defined as the ratio of the mechanical work done to the heat taken in at the source, the efficiency of the Carnot engine

$$\text{is } \frac{W}{Q_1} \text{ or } \frac{Q_1 - Q_2}{Q_1}.$$

Reversible Engines. Carnot's engine is an ideal one, but it gives us a start in the development of the subject of T. A reversible engine is not merely one that will work in the reverse direction, reverse in the sense that the cycle is performed backwards and work is converted into heat, but one that works backwards so that at each stage of the process the heat taken up (or rejected) is exactly equal to the heat rejected (or taken up) in the forward process. Furthermore, the work done by the engine in the reversed process must be exactly equal to the work done by the engine at the corresponding stage of the forward process. The conditions for reversibility in this sense include: (i) complete absence of frictional forces causing a dissipation of mechanical work; (ii) that no conduction of heat shall take place; (iii) that pressure differences between the working substance and the external atmosphere shall always be so small that 'free' expansion does not take place at any stage. It is clear that no real engine is reversible. Nevertheless, in accordance with the usual practice of discussing the mathematical physics of ideal processes in order to develop the underlying theory of engineering processes, the study of reversible engines leads to valuable results. Carnot's engine is a reversible engine, and from a study of its performance we are led to the conclusion known as *Carnot's Principle*, viz. no heat engine working between 2 given temps. as source and condenser respectively can be more efficient than a reversible one. The formal proof of this principle depends on *The Second Law of T.* Two equivalent statements of this law are as follows: *It is impossible for a self-acting machine, unaided by any external agency to convey heat from one body to another at a higher temperature (Clausius).* In other words, heat cannot of itself pass from one body to a hotter body. Kelvin's statement of this law reads: *It is impossible by means of inanimate material agency to derive mechanical effect by cooling a body below the temperature of the coldest of the surrounding bodies.* In other words, work cannot be obtained by using up the heat of the coldest body of a system.

The Second Law applies only to complete cyclical processes; there is no direct proof of this law. Our confidence in it depends on the fact that it accords with our practical experience, and no objection to it has yet been upheld. The meaning of the law may be realised from the approximate statement that an engine must

work by drawing heat from a furnace and rejecting heat to a condenser. If the condenser is at the same temp. as the furnace, the engine will not work; further, the engine will not work by using up the heat of the condenser and rejecting heat to the furnace.

Proof of Carnot's Principle. Let A be a reversible engine, and let B be an engine working between the same source and condenser as A. Then it follows that the efficiency of B cannot be greater than that of A. For suppose it is; let the 2 engines be coupled together so that B working forwards drives A working backwards, and let B take up a quantity of heat Q from the source, while the amount of working substance in engine A is adjusted so that it delivers Q to the source when working backwards. If B rejects a quantity of heat Q_B to the condenser while A takes up a quantity of heat Q_A from it, then the efficiency of B is $\frac{Q - Q_B}{Q}$, while that of A is $\frac{Q - Q_A}{Q}$.

Since the former is supposed to be greater than the latter

$$\frac{Q - Q_B}{Q} > \frac{Q - Q_A}{Q}$$

The work done by B is $Q - Q_B$; that done by A is $Q - Q_A$. Hence the compound engine can do an amount $Q_B - Q_A$ of work in an external system. Now the net loss of heat from the source is zero, while the net loss of heat from the condenser is $Q_A - Q_B$. Hence this compound engine does work by using up the heat of the condenser. This violates the Second Law of T. Hence $\frac{Q - Q_B}{Q}$ cannot be greater

than $\frac{Q - Q_A}{Q}$, i.e. no engine can be more

efficient than the reversible one working between the same source and condenser. Similarly, it may be proved of all reversible engines working between the same source and condenser. It is interesting to note that the most efficient heat engines, the steam turbines, actually used to-day have an efficiency of about 33 per cent, and the efficiency of Diesel engines may be as high as 38 per cent.

The whole science of T. is based on the 2 laws already stated. From this point, however, the science develops along 2 main lines: (i) its applications to heat engines; (ii) to pure T., a powerful method of analysis in deriving a variety of important physical and chemical results. The theory of heat engines derives much from the theory of pure T.

Kelvin's Absolute Scale of Temperature. The definition of a scale of temp. is given under THERMOMETER. Kelvin's absolute scale of temp. is independent of the properties of any thermometric substance, and it is absolute in this sense. It is derived as follows: Let Q_1 be the heat taken in at temperature t_1 by a reversible engine, and let Q_2 be the heat it rejects to the condenser at temperature t_2 . Then its efficiency is $\frac{Q_1 - Q_2}{Q_1}$ and by Carnot's

Principle this is the efficiency of all reversible engines working between the

source and condenser. Hence $\frac{Q_1 - Q_2}{Q_1}$ or $(1 - \frac{Q_2}{Q_1})$ depends only on t_1 and t_2 , or mathematically, $\frac{Q_1}{Q_2} = f(t_1, t_2)$ where f is some unknown function. Suppose we have 2 reversible engines, one working between t_1 and t_2 and the other between t_2 and t_3 , adjusted so that the first absorbs Q_1 from the source and rejects Q_2 to the condenser, while the second absorbs Q_2 from its source and rejects Q_3 to its condenser.

Then $\frac{Q_1}{Q_2} = f(t_1, t_2)$ and $\frac{Q_2}{Q_3} = f(t_2, t_3)$. If these engines are coupled together they will act as a compound reversible engine absorbing Q_1 at the source t_1 and rejecting Q_3 to the condenser at t_3 .

Hence $\frac{Q_1}{Q_3} = f(t_1, t_3)$. But $\frac{Q_1}{Q_3} = \frac{Q_1}{Q_2} \cdot \frac{Q_2}{Q_3}$.
Hence $f(t_1, t_3) = f(t_1, t_2) \cdot f(t_2, t_3)$.
 $\therefore f(t_1, t_3) = \frac{f(t_1, t_2)}{f(t_2, t_3)}$.

Suppose, now, t_3 is some standard temp. while t_1 and t_2 are variable. The $f(t_1, t_3)$ may be written as $\phi(t_1)$, where ϕ is some different function, and $f(t_3, t_3) = \phi(t_3)$.

Hence $f(t_1, t_3) = \frac{\phi(t_1)}{\phi(t_3)}$
and therefore $\frac{Q_1}{Q_3} = \frac{\phi(t_1)}{\phi(t_3)}$

Kelvin therefore adopted a scale of temp. on which $\phi(t_1) = T_1$; $\phi(t_2) = T_2$. Hence $\frac{Q_1}{Q_3} = \frac{T_1}{T_3}$. In other words, on the

Kelvin scale of temp. the ratio of 2 temps. is defined as the ratio of the heat absorbed at the source to the heat rejected to the condenser by a reversible engine working between those 2 temps. In view of Carnot's Principle the ratio $\frac{T_1}{T_2}$ is the same

whatever be the working substance in the engine, i.e. this scale is independent of the peculiar properties of any thermometric substance, and it is therefore absolute.

A T. thermometer consists of a series of reversible engines each doing the same amount of work W in a cycle. The first takes in Q_1 at temp. T_1 and rejects Q_2 at temp. T_2 ; the second takes in Q_2 at temp. T_2 and rejects Q_3 at temp. T_3 ; etc.

But $W = Q_1 - Q_2 = Q_2 - Q_3 = \dots$ etc., and from above, $\frac{Q_1}{T_1} = \frac{Q_2}{T_2} = \frac{Q_3}{T_3} = \dots$ etc.

$\therefore T_1 - T_2 = T_2 - T_3 = \dots$ etc. Thus equal intervals of temp. are indicated on the absolute scale of temp. When we reach the temp. 0° on this scale usually written 0°K. , the above equations show that the heat rejected to the condenser is zero, i.e. the condenser at that temp. cannot give up any heat to an engine using it as source. This is therefore the lowest possible temp., and the zero of the absolute scale of temp. is the absolute zero of temp. The Kelvin scale

is, of course, an ideal scale, but the scale of a perfect gas thermometer can be shown to coincide with its indications. Now although there is no gas that is perfect, it is possible to reduce the readings of a gas thermometer, such as the hydrogen thermometer, to those of the ideal perfect gas thermometer. Hence all thermometer readings can be referred to the absolute scale of temp., thus avoiding the idiosyncrasies of the different thermometric substances.

Entropy. If a substance undergoing a reversible change takes in a quantity of heat dQ at temp. T , $\frac{dQ}{T}$ is called the increase of *entropy* of the substance. All natural processes are irreversible, and it can be shown that there is always an increase of entropy in such processes. Increase of entropy is accompanied by a loss of available energy in a system. Hence it follows that the processes of radiation, convection, conduction, etc., that involve an increase of entropy of the material universe also involve a loss of available energy in the universe. The entropy of the universe tends to a maximum that will be reached when all temp. differences have disappeared. The available energy in the universe will then be exhausted (Second Law of T.) and the universe will suffer, what Jeans terms a 'Heat-death.' Entropy, like potential energy, has an arbitrary zero. Only changes of entropy are significant, indicating the change of state of a system.

See T. H. Preston, *Theory of Heat*, 1929; R. H. Fowler and E. A. Guggenheim, *Statistical Thermodynamics*, 1949; J. R. Partington, *A Textbook of Thermodynamics*, 1950; M. N. Saha and B. N. Srivastava, *A Treatise on Heat*, 1950; J. K. Roberts and A. R. Miller, *Heat and Thermodynamics*, 1951; J. L. Fuick, *Thermodynamics from the Classic and Generalized Standpoints*, 1955; M. W. Zemansky, *Heat and Thermodynamics*, 1958.

Thermo-electric Pyrometer, see PYROMETER.

Thermoelectricity. Seebeck found in 1821 that if a circuit consisting of 2 dissimilar metals be taken and the junctions kept at different temps., a steady current will flow in the circuit. The 2 metals are said to form a *thermocouple*, and the Seebeck effect is now widely used for the measurement of temp. In 1834 Peltier found that when a current was passed across a junction of 2 dissimilar metals reversible heating effects occur. Heat is evolved when the current passes one way across the junction and absorbed when it passes in the opposite way. This is called the *Peltier effect*. From thermodynamic reasoning, if a circuit were made of 2 dissimilar metals and one junction were kept at a constant temp., the E.M.F. in the circuit should increase as the temp. of the other junction is increased. It is found, however, that as the temp. of the second junction is gradually raised, the E.M.F. increases to a certain limit, then decreases again, and is finally reversed. Lord Kelvin predicted in 1851 and later

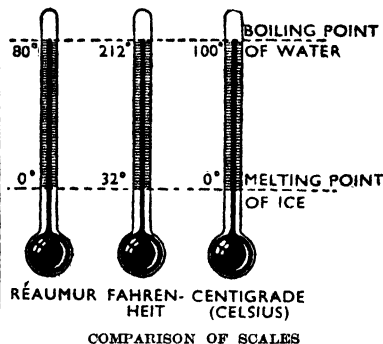
observed that when a current flows along a wire the temp. of which varies from point to point, heat is liberated at a given point in the wire when the current is flowing in one direction, and absorbed when the current is in the opposite direction. This reversible heating effect is known as the *Thomson effect*.

Thermograph, instrument used for automatically recording temperature. There are 3 main types, bimetallic, mercury-in-steel, and electrical-resistance. The bimetallic T. (a standard meteorological instrument) works by the coiling and uncoiling of a strip formed by welding together 2 metals with different coefficients of thermal expansion, the movement being magnified, and transmitted to a pen working on a drum, by levers. The mercury-in-steel type, in which changes in pressure caused by expansion and contraction of the mercury in a metallic bulb are transmitted to the recorder by a narrow-bore steel tube, is specially suitable for remote recording. The electrical resistance thermometer (also suitable for remote recording) depends on the fact that the electrical resistance of a wire (usually platinum or nickel) varies with its temperature. The record is usually made by a recording potentiometer.

Thermometers and Thermometry. The thermometer is any instrument that measures the variations of sensible heat or temp. (q.v.). The effects of temp. on different substances vary considerably, but ignoring the promotion or retardation of chemical action and modification of the properties of matter, we can deal with the relevant change for the present purpose—expansion or contraction. In general, a rise of temp. causes bodies to expand and a fall of temp. causes them to contract, and although there are exceptions to this rule, they do not affect the metals and liquids used in T. Mercury as a thermometric liquid has many advantages over other liquids, amongst which may be noticed its wide range (-40°C . to 356°C . and up to 570°C . under pressure) in the liquid state; its regular expansion, which is very nearly, though not quite, proportional to changes of absolute temp. (q.v.); its utility in fine capillary tubes, which it does not 'wet'; and the expeditious way of obtaining it in a very pure form. On the other hand, alcohol has a lower range (to -80°C .) while pentane can be used as low as -200°C .

Temp. can be ascertained by noticing the change in the volume of a body or a liquid. Two temps. are taken as points of reference: that of melting ice and that of steam given off by water boiling under normal atmospheric pressure, which is 760 mm. of mercury. This is essential, as boiling point is affected by atmospheric pressure. Many other precautions and refinements are necessary in the manuf. of T., and for these details readers are referred to any standard work on Heat. Three T.s are in general use, the Centigrade (or Celsius) (the centesimal scale was adopted by Celsius in 1742), the Fahrenheit, and the Réaumur. On the

Centigrade scale the freezing point is taken as zero and the boiling point as 100° , the space between being divided into 100 equal intervals, each known as a degree. Graduations on the same scale are extended on either side of these standard points, those below freezing point being negative. This scale is usually employed for scientific purposes. On the Fahrenheit scale the freezing point is marked 32° and the boiling point 212° , so that 180° correspond to the range between freezing point and boiling point, and hence 100°C . are equal to 180°F ., or, expressed more simply, $5^{\circ}\text{C} = 9^{\circ}\text{F}$. On the Réaumur scale the freezing point is also taken as zero, like the Centigrade scale, but the boiling point is taken as 80°C . This thermometer is used in some European countries for medical and domestic purposes just as the Fahrenheit thermometer is in Great Britain. Clinical T. in the latter country are always Fahrenheit.



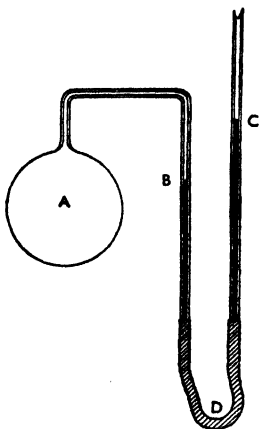
Maximum and minimum T. for recording highest and lowest temps. vary in construction. Rutherford's maximum self-registering thermometer consists of an ordinary mercury thermometer placed in a horizontal position, and having a small piece of steel inside the tube *beyond* the mercury. As the mercury expands with increase of temp. it pushes the steel before it, and as it contracts it leaves the steel in the farthest position to which it has been driven. The end of the steel nearest the surface of the mercury marks the highest temp. since it was last set. The instrument can be reset for another observation by means of a magnet. The minimum thermometer contains alcohol instead of mercury, and *inside* the alcohol contained in the tube there is a small index of glass, with the farthest end touching the surface of the alcohol. This tube is also placed horizontally. As the alcohol contracts it carries the index of glass with it, but when it expands the index is left behind. Thus the end of the index nearest the surface of the spirit shows the lowest temp. The index can be again got into position by inclining the tube.

In addition to the usual T. in which mercury, alcohol, etc., measure the changes in temp. there are other types, such as the metallic thermometer, the platinum resistance thermometer, the thermo-couple thermometer, and the gas thermometer. The metallic thermometer—the best known instrument of this class is Breguet's thermometer—depends on the principle that if 2 strips of different metals with unequal coefficients of expansibility be firmly fixed (e.g. riveted) together and wound into a spiral with the most expandable metal inside, a rise of temp. causes the spiral to unwind. This is due to the greater expansion of the inner strip, and similarly, a fall of temp. causes the spiral to wind up. A needle deflected in the process of winding or unwinding indicates the variation in temp. In the platinum resistance thermometer use is made of the well-known fact that the resistance of platinum to an electric current varies with change of temp. The Wheatstone Bridge enables very small changes in resistance to be detected, and hence the small changes in temp. can be determined. The thermo-couple thermometer is based on the principle of the thermo-couple—that electric currents can be produced by applying heat or cold to one of the junctions in a circuit composed of 2 different metals. If a very delicate galvanometer is used to measure the current the temp. can be deduced, and temps. up to 1500°C . can be measured with great accuracy in this way. (See PYROMETER.) A gas thermometer is much more sensitive than the ordinary types of T., owing to the relatively large coefficient of expansion of gas. It suffers from the defect that it is cumbersome and also requires a large amount of the liquid, etc., the temp. of which is to be found.

The figure shows essential parts of a simple gas thermometer known as the Constant-volume Air Thermometer. The large bulb A and the connecting wide capillary tube contain air or hydrogen, etc., while the tubes BDC form a simple manometer. The instrument is calibrated by placing the bulb in clean, melting ice and allowing the air to take up the temp. of the ice. The vertical tube C is now raised or lowered until the mercury in the vertical tube B is brought opposite some convenient graduation on a scale mounted between B and C, and the pressure of the air in the bulb is then read off from the manometer. In the present instance the pressure would be $P + H$, where P is the height of the mercury barometer and H is the vertical height of C above B. Suppose this pressure is called p_0 . The bulb is now placed in boiling water and the tube C is again adjusted to bring the mercury in B back to the same graduation as before. Hence the name constant-volume air thermometer. Let p_{100} be the pressure of the air in the bulb at the boiling point of water taken as 100°C , 760 mm.; see previous remarks on atmospheric pressure and boiling point. Then a rise of 1°C . on this thermometer is defined as the rise of temp. that produces an increase of pressure of the constant vol. of

air of amount $\frac{p_{100} - p_0}{100}$. The temp. corresponding to any pressure p of the constant vol. of air will be $\frac{p - p_0}{p_{100} - p_0} \cdot 100^{\circ}\text{C}$.

See *Temperature; its Measurement and Control in Science and Industry*, vol. 1, 1941, vol. II, 1955; W. E. K. Middleton, *Meteorological Instruments*, 1943; A. J. Hall, *Fundamentals of Thermometry*, 1953, and *Practical Thermometry*, 1953.



CONSTANT-VOLUME AIR THERMOMETER

Thermonuclear Reaction, a reaction caused by an extremely high local temp. between nuclei which have high velocities. The reaction can lead to the *fusion* of 2 nuclei of low atomic weight to form a single nucleus, the mass of which is less than the sum of the masses of the 2 original nuclei. The excess mass appears as a relatively large amount of energy. This in turn can cause more light nuclei to react, and produce yet more energy, and a chain reaction can result. More complex nuclear reactions can also take place, but the ones of particular interest are those in which energy is produced at the expense of the total mass of the original particles. A device designed on this principle can therefore explode, or may be controlled to act as a new source of nuclear power (q.v., see ZETA). This has been realised in the hydrogen bomb or H-bomb, which is many times more powerful than the conventional atom bomb (q.v.), which works by *fission* of heavy nuclei. The main difficulty is to produce a sufficiently high temp. for the T. R. to be initiated. In the H-bomb the source of heat is a fission bomb embedded inside the light elements, and a jacket of fissionable material is usually added to increase the efficiency. See NUCLEUS; HYDROGEN BOMB; ZETA.

Thermoplastics, see PLASTICS.

Thermopylae, often called simply **Pylae**, celebrated pass leading from Thessaly into Locris. The pass of T. is especially celebrated on account of its heroic defence by Leonidas (q.v.) against the Persians in 480 BC.

Thermos Flask, see **VACUUM FLASK**.

Thermosetting, see **PLASTICS**.

Thermostat, instrument for maintaining an appliance set at a predetermined temp. All T.s comprise essentially an element extremely sensitive to temp. changes and a switch or lever. For the simplest form of temp. element use is made of one or other of the following properties: the expansion of metals; the increase in vol. of a liquid; the increase in pressure of a fluid.

T.s which depend upon the expansion of metals are known as the bimetal type and consist of a composite strip of 2 metals with widely different coefficients of expansion. This strip may be used flat or formed into a coil, one end being free and the other fixed. When the temp. alters, the unequal expansion of the 2 metals causes distortion, and an appreciable movement is produced at the free end, which in turn moves the switch or lever. A magnet is sometimes used in the bimetal type so that the completion of the closing operation is positive and quick; this is useful in the control of an electrical device to prevent any sparking which might be caused by a poor contact. The 2 metals usually employed are brass, which has a large expansion, and a steel alloy with a negligible expansion. For liquid heating control the composite strip is in a brass tube which is inserted in the medium. Bimetal T.s are used for many types of temp. control, among which may be mentioned the regulation of boilers, immersion heaters, cookers, and space heating.

The second type of T. consists of a cylindrical bulb, a capillary tube, and a metallic bellows. The system is completely filled with a liquid and sealed, so that the only way in which the liquid can expand when the temp. rises is by pressure on the bellows. Attached to the latter is a rod with spring adjustment which moves the device attached to it. The bellows type is often used where it is necessary or desirable for the sensitive element to be at a distance from the switch or lever. It is used in most refrigerators and in some air-conditioning plants. In space-heating the sensitive bulb is mounted directly on the bellows.

The third or vapour-pressure type T. is similar to the second except that the system is only partially filled with a volatile fluid of a low boiling point, leaving a vapour space. As the pressure of the vapour will vary according to the temp., movement will again be produced by the bellows. See also **FIRE BRIGADES AND FIREFIGHTING**, **Fire Alarms**. See **Temperature: Its Measurement and Control in Science and Industry**, vol. i, 1941, vol. ii (ed. by H. C. Wolfe), 1955; R. Griffiths, **Thermostats and Temperature Regulating Instruments**, 1951.

Thesaurus, see **DICTIONARY**.

Theseus, legendary hero of Attica, son of Aegeneus, King of Athens, and of Aethra, daughter of Pittheus, King of Troezen. Brought up at Troezen, when he reached maturity he took his father's sword and sandals, and went to Athens. Acknowledged by Aegeneus as his heir, after slaying the Marathonian bull, T. went of his own accord as one of the 7 youths and 7 maidens whom the Athenians had to send every year to Crete, to be devoured by the Minotaur (q.v.). In Crete Ariadne, the daughter of Minos, was enamoured of T., and gave him a sword with which he slew the Minotaur, and a clue of thread by which he found his way out of the labyrinth. Having effected his object, T. sailed away, taking Ariadne. In Naxos, however, Dionysus carried her off. In his grief, T. forgot to hoist the white sail, which was to have been the signal of the success of the expedition; whereupon Aegeneus drowned himself in the sea, and T. became King of Athens. T. fought the Amazons and carried off their queen, Antiope, who bore him a son, Hippolytus. He was one of the Argonauts; hunted the Calydonian boar; helped Adrastus to recover the bodies of the slain at Thebes; helped Pirithous and the Lapithae against the Centaurs; with Pirithous abducted the young Helen from Sparta and tried to abduct Proserpina from Hades. In this last-named adventure Pirithous perished and T. was a captive until freed by Heracles. Meanwhile Menestheus aroused the people against T., who, unable to re-establish his authority, retired to Scyros, where he was treacherously hurled from a cliff by the king, Lycomedes, and killed. See L. Cottrell, *The Bull of Minos*, 1955.

Thesiger, Frederick; Frederick Augustus; and Frederick John Napier; see CHELMSFORD, first, second and third BARONS.

Thesmophoria, festival of Demeter as founder of agriculture and patroness of marriage, celebrated widely in Greece and especially at Athens. It was held for 5 days in the month Pyanepsion (early Nov.), only married women of Attic birth and stainless character taking part. On the first day (*stenia*) a procession went to the deme (parish) of Halimus. Another theory says that the T. were in honour of Ceres Thesmophoros (law-giver) as the first who taught man the use of laws. The institution of the T. is ascribed by some to Triptolemus, by some to Orpheus, and by others to the Danaids.

Thespieae, anct Gk city near the foot of Mt Helicon in Boeotia. The neighbouring and more powerful city of Thebes dismantled its walls in 423 BC, captured it in 372, and razed it to the ground. At T. was preserved the statue of Eros by Praxiteles.

Thespis (fl. 6th cent. BC), father of Gk tragedy. He introduced into the old tragedy connected with the Dionysian festivals an actor, for the sake of giving rest to the chorus. This actor took various parts in the same piece under various disguises, which took the form of lion masks. See A. W. Pickard-Cambridge, *Dithyramb, Tragedy, and Comedy*, 1927.

Thesprotia, dept. of Greece in the prov. of Epirus. Pop. 47,300.

Thessalonians, The *Epistles to the*, were probably written by St Paul from Corinth when he was working there with Silvanus and Timothy (Acts xviii. 5) between AD 51 and 53. They are, therefore, among the earliest of St Paul's epistles, and their genuineness is universally acknowledged. Acts xvii describes St Paul's visit to Thessalonica, and the bad reception he received from the Jews. The Greeks and devout women, however, showed much eagerness, and to them he turned. The *Epistles*, then, which followed each other closely, were addressed to a Gentile audience. The immediate occasion of the First *Epistle* is the good news brought by Timothy of the steadiness of the Thessalonians in the faith in spite of persecution by their countrymen. From it we learn what had been St Paul's message and appeal when he was himself in Thessalonica. He had appealed to the primary feelings of the human heart and then passed on to speak of Jesus, 'who delivereth us from the wrath to come' (i. 10). This particular insistence on the Judgment and the Second Advent had led to much questioning, and in the latter part of the letter St Paul deals with this. His letter, however, did not settle all difficulties, though the news which he later received from Thessalonica was in many aspects encouraging. The expectation of the second coming of the Lord still caused great excitement and the neglect of the duties of daily life. The Second *Epistle* is intended to correct this. See C. Lattey's trans. of the *Epistles to the Thessalonians*, 1913; H. N. Bate, *Guide to the Epistles of St Paul*, 1926; and commentaries by Milligan, 1908; Plummer, 1918; Bicknell, 1939.

Thessalonica, or Thessaloniki, see SALONICA.

Thessaly, largest div. of anct Greece. T. proper is a large plain, drained by the R. Peneus and its affluents. About 70 m. across, it is shut in on every side by mt barriers, broken only at the N.E. corner by the valley and defile of Tempe, which separates Ossa from Olympus. There were 2 other dists. included under the general name of T.; one, called Magnesia, being a long narrow strip of country extending along the coast of the Aegean Sea from Tempe to the Pagasæan Gulf, and the other a long narrow vale at the extreme S. of the country, lying between Mts Othrys and Oeta. Thessaly proper was divided in very early times into 4 dists. or tetrarchies, a div. which we still find subsisting in the Peloponnesian War. These dists. were: (1) Hestiaeotis, in the NW.; (2) Pelasgiotis, in the E.; (3) Thessaliotis, in the SW.; and (4) Phthiotis, in the SE. It is in this dist. that Homer places Phthia and Hellas proper, and the dominions of Achilles. Besides these there were 4 other dists., viz.: (5) Magnesia; (6) Dolopia, a small dist. bounded on the E. by Phthiotis, on the N. by Thessaliotis, on the W. by Athamania, and on the S. by Oetaea; (7) Oetaea, a dist. in the upper valley of the Spercheus; and

(8) Malis. The Thessalians were a Thesprotian tribe, and invaded the W. part of the country, afterwards called Thessaliotis, whence they subsequently spread over the other parts of the country. The gov. in the separate cities became oligarchical, the power being chiefly in the hands of a few great families descended from the anct kings. Of these, 2 of the most powerful were the Alenadae and the Scopadae. The Thessalians never became of much importance in Gk hist. In 344 BC Philip completely subjected T. to Macedonia. The victory of T. Flamininus at Cynoscephalae, in 197, again gave the Thessalians a semblance of independence under the Romans. The area of modern T. is given as 5200 sq. m. and its pop. 569,300. In recent years excavations have been made by the Brit. School of Archaeology in Athens. Mineral deposits exploited include iron-pyrites, copper, zinc, bitumen, and marble.

Thetford, mun. bor. and mkt tn of Norfolk, England, situated on the borders of the great state forest of Thetford Chase and the Breckland. The Rs. Thet and Little Ouse unite just above the tn bridge. It was once the cap. of the kingdom of E. Anglia. The earthworks of Castle Hill are one of the largest and most interesting examples of early military fortifications in England. The site of the Saxon tn has been excavated by the Ministry of Works, and many interesting objects can be seen in the Ancient House Museum. The ruins of the Clunlac priory (founded c. 1103) stand on the banks of the Little Ouse. There are remains of the Benedictine Nunnery of St George and of the monastery of the Canons of the Holy Sepulchre. Pop. 4700.

Thetford Mines, city of Quebec, Canada, 64 m. N.E. of Sherbrooke, situated in the centre of the serpentine belt rich in long-fibred asbestos. The prin. industry is asbestos mining. Pop. 19,300.

Thetis, Gk sea-goddess, daughter of Nereus and Doris, and mother of Achilles. Poseidon and Zeus sued for her hand; but when Themis declared that T.'s son would outshine his father, both gods withdrew. Others said T. rejected Zeus because she had been reared by Hera and that the god, in revenge, decreed that she should wed a mortal. At length she was wed against her will to Peleus.

'Thetis', Brit. submarine of the Trident class (1090-1575 tons), which on her trial run sank in Liverpool Bay on 1 June 1939 with the loss of 99 lives, only 4 men being saved. The submarine was beached on 3 Oct. on the Anglesey coast, recommissioned for war service as the *Thunderbolt*, and then finally lost through enemy action off the coast of Sicily on 13 March 1943 with the loss of all hands.

Theuriet, Claude André (1833-1907), Fr. novelist and poet, b. Marly-le-Roi. His first poems *Le chemin des bois*, 1867, were crowned by the Fr. Academy. He subsequently wrote a vast number of novels, among which were *Mademoiselle Guignon*, 1874, *Le Filleul du Marquis*, 1878, *Le fils Maugars*, 1880, *Flavie*, 1885, and *Dans les roses*, 1899. His work

shows a deep feeling for nature, but often insufficient characterisation. He was elected to the Academy in 1896.

Thibaud, Jacques (1880-1953), Fr. violinist, b. Bordeaux. Hestudied under Marsiek at the Paris Conservatoire, and his rise to fame as a virtuoso dates from 1898. In technique, he represented the wide and pure technique of the great classical school passed down to him through Marsiek and Ysaye. From 1905 he was especially associated in a trio with Cortot and Casals. He was killed in an aeroplane crash.

Thibaudet, Albert (1874-1936). Fr. literary historian b. Tournus, Saône-et-Loire. From 1925 he was prof. of literary hist. at Geneva. He was chiefly interested in the literature of the late 19th cent., and contributed regularly to the *Nouvelle Revue Française*. Among his works are *La poésie de Mallarmé*, 1912, *Flaubert*, 1922, *Intérieurs*, 1924, *La république des professeurs*, 1927, *Mistral*, 1930, *Physiologie de la critique*, 1930, *Stendhal*, 1931, *Histoire de la littérature française de 1789 à nos jours*, 1936. See life by G. Truc, 1935.

Thibault, Jacques Anatole, see FRANCE, ANATOLE.

Thibaut, Anton Friedrich Justus (1774-1840), Ger. jurist, b. Hameln. After studying at Göttingen, Königsberg, and Kiel, he was appointed prof. of civil law at the last-named univ. in 1798. In 1802 he removed to Jena, and 4 years later to Heidelberg, where he remained till his death. He published *Theorie der logischen Auslegung des Römischen Rechts*, 1799, etc.

Thibaw, or Hsipaw, Shan state of Upper Burma, with an area of 5080 sq. in., traversed by the Nantun. Rice, cotton, and tea are the chief articles of produce. Pop. 130,000.

Thibet, see TIBET.

Thielt, see TIELT.

Thiepval, vil. on the R. Ancre, near Albert, France. It was the focal point of desperate fighting in the First World War, particularly during the Somme battles of July 1916, when it was taken by Brit. forces. In 1932 the Somme memorial was unveiled here by the then Prince of Wales.

Thierry, Jacques Nicolas Augustin (1795-1856), Fr. historian, b. Blois. On leaving school he became secretary to Saint-Simon, at whose suggestion he pub. his first work, *De la Réorganisation de la société européenne*, 1814. He became blind in 1826, but continued his historical studies. His *Histoire de la Conquête de L'Angleterre par les Normands* was pub. in 1825. His other pubs. include *Lettres sur l'histoire de France*, 1820, *Dix ans d'études historiques*, 1834, *Récits des temps mérovingiens*, and *Recueil des Monuments inédits de l'histoire du Tiers État*, 1850-70. T. belongs to the now discredited school of Romantic historians, but his accurate scholarship makes his work of lasting value in spite of its somewhat florid style.

Thiers, Louis Adolphe (1797-1877), Fr. statesman and historian, b. Marseilles of humble parentage, and studied law at Aix.

In 1821 he began writing for the *Constitutionnel*, and next collaborated with Félix Bodin in the production of *Histoire de la révolution française*, 1823-7, the greater part of which was the work of T. In 1830 his antipathy to the Bourbons prompted him to seek a more vigorous polemical field than that of the *Constitutionnel*, and, with Carrel, he founded the *National*, which helped to provoke the revolution later that year. After Louis Philippe became king T. was rewarded for his publicist services by being nominated a councillor of state and given a post in the Treasury. Later he became under-secretary of state to the treasury (1831), supporting the peace policy of Casimir Périer. T. was minister of the interior in Soult's cabinet of 1832 during the Paris insurrection. Four years later he was placed at the head of the Cabinet, and carried out, among other liberal reforms, the suppression of lotteries and gaming-houses, and the reduction of tariff duties on inland trade. In 1840 he became president of the council and foreign secretary. He supported Mehemet Ali against Turkey with the object of assuring to the latter the retention of Egypt. Later, after the conclusion of peace between England, Russia, Turkey, Prussia, and Austria, he prepared for war as a demonstration against the exclusion of France from the European concert, but his policy resulted only in the prompt recalling of the Fr. fleet from Turkish waters and his own retirement. He then devoted himself to writing historical works, and pub. his huge work, the *Histoire du Consulat et de l'Empire*, 1845-69. After the *coup d'état* of 1851 T. was arrested and exiled. He returned to France the following year, but did not re-enter political life until 1860. In 1863 he was nominated deputy for one of the divs. of Paris. On the fall of the empire following upon the débâcle at Sedan, he was elected president of the assembly, and shortly after became president of the executive gov., his power being virtually those of a dictator. In 1873, however, wishing to avoid being made the instrument of monarchist intrigue, he voluntarily resigned. See R. Dreyfus, *Thiers contre l'Empire, la guerre, et la Commune 1869-71*, 1928; and lives by J. M. S. Allison, 1932, and M. Reclus, 1932.

Thiers, Fr. tn, cap. of an arron., in the dept of Puy-de-Dôme, on the Durolle. It is very picturesquely situated above a ravine. Its cutlery manufs. are renowned. Pop. 15,400.

Thigh, the part of the lower limb between the pelvis and the knee. The T.-bone, or *femur*, is the longest bone in the human body, constituting about 0.275 of the height from sole to crown. It articulates with the *os innominatum* above, and with the *tibia* below.

Thionville (Ger. *Diedenhofen*), Fr. tn in the dept of Moselle, on the Moselle. It is the cap. of 2 arrons.—E. and W. An anct fort. tn, Imperial diets were held here in the 8th cent. It has large iron and steel works, and manufs. chemicals. Pop. 17,600.

Thiopentone, *see* BARBITURATES; ANAESTHESIA.

Thiophene, C_4H_4S , a colourless liquid (b.p. $84^\circ C.$) discovered in 1883 by Victor Meyer as an impurity in benzene obtained from coal tar. It gives a blue coloration with isatin dissolved in concentrated sulphuric acid, and in its general properties closely resembles benzene (q.v.). T. may be separated from benzene by prolonged shaking with cold concentrated sulphuric acid, which removes the T.

Thiosulphate of Soda, *see* HYPO.

Thiouraea, $(NH_4)_2CS$, derivative of urea, has been used in the treatment of exophthalmic goitre; it is now replaced by thiouracil and its derivatives. These drugs depress the activity of the thyroid gland so that its surgical removal can often be avoided.

Third, in music the interval comprising any three successive notes of a diatonic scale. T.s can be major, minor, or diminished, in the last case being equal to major seconds on the pianoforte, but written to look like T.s, e.g. C \sharp -E \flat . A diminished T. is the inversion of an augmented sixth. The T. of a diatonic scale is the most characteristic interval, determining the difference between major and minor.

Third Estate, that Fr. social class which was represented in the states-general, as well as the clergy and nobility.

Third International or Komintern, *see* COMINTERN.

Third Party Insurance, *see* INSURANCE, *Public Liability and Motor*.

Third Reich, term applied to the Ger. National Socialist régime, formally begun on 1 Feb. 1934. The empire of 1871 to 1918, and the succeeding Weimar rep., were the two anterior constitutions. *See* GERMANY, *History*.

Third Republic, in France, lasted from the fall of the Second Empire (q.v.) in 1870 to the surrender of the Fr. Gov. on June 17, 1940. *See* FRANCE, *History*.

Third Silesian War, *see* SEVEN YEARS' WAR.

Thirlage, term used in Scots Law for the obligation under which possessors of certain lands were bound to have their grain ground at a particular mill—to which mill the lands were said to be 'stricted' or 'thirled'.

Thirlmere, lake of the Lake District, Cumberland, England, $3\frac{1}{2}$ m. SSE. of Keswick. It is 3 m. in length and about $\frac{1}{2}$ m. in width, with a depth of nearly 100 ft. It is surrounded by lofty heights; on its E. shore rise Helvellyn and White-side, whose slopes are well wooded, while on its W. side are Armboth Fells and Raven Crag, whose slopes are cut by mountain torrents. T. affords part of the water supply of Manchester.

Thirlwall, Connop (1797–1875), divine and historian, b. London; educ. at the Charterhouse and Trinity College, Cambridge. In 1840 he was appointed by Lord Melbourne to the see of St David's. His prin. work is a *History of Greece* (8 vols.), 1835–44. *See* J. C. Thirlwall, *Connop Thirlwall*, 1936.

Thirsk, mkrt tn and rural dist. of the N. Riding of Yorks, England, 22 m. from York. It has a beautiful par. church. Its fairs and mkrts are noted, and a trade is carried on in livestock, corn, wool, timber, etc. With the par. of Sowerby, it forms one continuous built-up area. Pop. 2500.

Thirst, desire for drink, made known by sensations projected to the pharynx. The amount of water contained in the body is subject to great changes. It is always being lost by various organs, the amount lost varying greatly with the conditions of life. This loss directly affects the blood, but this is not lasting, as the blood draws upon the vast resources of the other body tissues for its supply of water: consequently the tissues require a new supply to restore them to their normal state. The sense of T. then comes into play; we become thirsty and take into our bodies water in varying quantities according to our needs. Little is known concerning the nervous mechanism controlling this sensation, but it is assumed that as the water content falls below a certain amount the nerves in the pharyngeal region are stimulated and so give rise to T.

Thirty-Nine Articles, The, of the Church of England are described in their heading as 'Articles agreed upon by the archbishops and bishops of both provs. and the whole clergy, in the Convocation holden at London in the year 1562, for the avoiding of diversities of opinions, and for the establishing of consent touching true religion.' Their hist., however, begins before this date. On the death of Henry VIII, the gov. of the country was left in the hands of a group of nobles, of whom almost all were in favour of the reformed doctrines, and the changes in the teaching and practice of the Church increased with great rapidity. The anct landmarks were being removed, and it was desirable that fresh ones should be set up. In 1549 Parliament empowered the king to appoint a commission for the drawing up of eccles. laws, and in accordance with this Act a commission was appointed in 1551 consisting of 8 bishops, 8 divines, 8 lawyers, and 8 other representatives of the laity. The commission, which included Cranmer, Ridley, and overdale, began by drawing up a code of 42 articles which were pub. by royal authority in 1553. To these articles was prefixed Cranmer's *Catechism*. In the same year Edward VI died, and the Convocation of the first year of Mary denied that the articles had received its consent, and entirely repudiated them. The tide of reformation was thus stemmed for a while, but on the accession of Elizabeth it was resumed. This period is marked by greater moderation. Parker occupied the see of Canterbury, and he submitted to Convocation a revised form of the original 42 articles. These underwent considerable further alterations, in course of which they were reduced in number to 39 and were finally promulgated in 1571. The first half of the twentieth article was omitted in some copies, and there con-

tinued to be some discussion as to which was the authorised form, until in 1804 they were finally settled in the form in which they are now used. The T. A. were adopted by the Convocation of the Irish Church in 1635, and by the Scottish Episcopal Church in 1804. There has been, especially during the last cent., much controversy as to the nature and meaning of the articles. Some have tried to interpret them as an orderly body of divinity, but they are plainly devised to meet a special need, and bear the marks of compromise in every line. *See also* ENGLAND, CHURCH OF. Commentaries are those of W. Beveridge, 1716, and Harold Browne, 1850. *See* E. J. Bicknell, *A Theological Introduction to the Thirty-Nine Articles*, 1919; W. H. G. Thomas, *The Principles of Theology, an Introduction to the Thirty-Nine Articles*, 1930.

Thirty Years' War, *The*. Practically it may be said that the T. Y. W. was the result of the Ger. Reformation and the Counter-Reformation. The war began in 1618 by the offer of the crown of Bohemia to the Lutheran prince, the elector of the Palatinate, son-in-law of James I of England and father of the Princes Rupert and Maurice. The troops of the Emperor immediately entered Bohemian ter. and drove out Frederic, depriving him also of his electorate of the Lower Palatinate, a task rendered more easy by the inactivity of James I of England. The ter. annexed by the Emperor Ferdinand were handed over to Maximilian of Bavaria and so became Catholic; an illustration of the 16th-cent. principle that the religion of the prince is also the religion of his subjects. The Hapsburgs now developed their policy on larger lines; Germany was to become an exclusive Hapsburg possession and the ter. lost to Catholicism by the Reformation was to be regained. The imperial gens., Tilly and Wallenstein, swept all before them; N. Germany and the Baltic ports seemed to lie at their mercy. Christian IV of Denmark came forward as the champion of Ger. Protestantism, but was defeated and forced to make peace in 1629 (Lübeck). Wallenstein had estab. the Hapsburg supremacy in the N., but had failed to take Stralsund. In the following year Gustavus Adolphus, aided by Fr. subsidies, came forward as the champion of Protestantism, and with his appearance began the turn of the tide. Wallenstein had been dismissed at the Diet of Ratisbon; the Ger. princes feared the man, whom they regarded as a mere mercenary upstart. Gustavus Adolphus marched from victory to victory. Tilly was defeated at Breitenfeld, and Gustavus marched to the S. In 1631 he again defeated, and killed, Tilly on the banks of the Loch, and then Wallenstein was recalled. Gustavus won the battle of Lützen (1632), but was killed, and much of his work was undone. From this point the religious motives of the war entirely disappear. France, anxious to break the power of the Hapsburgs, gave support to the Swedes and Ger. Protestant princes. Richelieu played his hand well; enemies

to the Hapsburgs were raised up in Germany, Italy, and Spain; the Dutch were given support in their struggle against Sp. power; and the power of the Hapsburgs, both Austrian and Sp., began to decline. The policy of Richelieu was continued after his death by Mazarin, and the Fr. gens. Condé and Turenne won brilliant victories over the imperialists. Finally, the end came in 1648, when the Emperor, suffering from defeats in Germany at the hands of the Swedes and the French, agreed to terms of peace. The treaty of Westphalia (q.v.) was signed in Oct. 1648. The territorial gains of Franco and Sweden, and the independence of the Ger. princes, were recognised. The attempted revival of the power of Catholicism by the sword had failed, and the imperial power became nominal except in Austria. The independence of Switzerland and the United Provinces (Holland) was also recognised by this treaty. The terrible devastation which the war caused in Germany had political and social consequences which were to last for sev. cents. *See* S. R. Gardiner, *The Thirty Years' War* (11th ed.), 1898; H. G. R. Rende, *Sidelights on the Thirty Years' War*, 1925; C. V. Wedgwood, *The Thirty Years' War*, 1944.

Thiſbe, *see* PYRAMUS AND THIſBE.

Thisted: 1. Amt. in N. Jutland, Denmark, on the N. Sea; it includes the is. of Mors in the Lim Fjord. Area 685 sq. m.; pop. 86,700.

2. Cap. of the above, on the Lim Fjord, 45 m. WSW. of Aalborg. Pop. 9935.

Thistle, name given to various composite plants, of which the best known are those that belong to the genera *Carduus* and *Cnicus*. Others are the Scotch T. (*Onopordon acanthium*); the Carline T. (*Carlina vulgaris*); the Globe T., which belongs to the genus *Echinops*; and the Hedgehog T. (*Echinocactus*). The Holy T. is *Silybum marianum*; its roots and young leaves are edible.

Thistle, Order of the, *see* ORDERS OF KNIGHTHOOD, GREAT BRITAIN AND IRELAND (2).

Thistle-finch, *Black-headed*, *see* SISKIN.

Thistleton-Dyer, Sir William Turner, *see* DYER.

Thistlewood, or **Thistlethwaite**, Arthur (1772-1820), conspirator, b. Tupholme, Lincs. He served in the army, and having absorbed revolutionary ideas in America and France, became a reformer and sought to achieve his ends by the use of violence. His project in 1820 to assassinate the cabinet ministers when gathered together at dinner at Lord Harrowby's house in Grosvenor Square, failed owing to one of the body giving away the secret. T. and his associates were caught in a loft in Cato Street, London, and the attempt became known as the Cato Street Conspiracy (q.v.). T. was tried for high treason, and hanged.

Tholos (Gk.), in architecture, either: (i) the dome over a circular building; or (ii) the domed circular building itself, e.g. at Epidaurus in Greece.

Tholuck, Friedrich August Gottreu (1799-1877), Ger. theologian and preacher,

b. Breslau, studied in his native city and at Berlin. Here he came under Neander's influence, and in 1824 succeeded De Wetie as prof. of oriental languages. In 1826 he went to Halle as prof. of theology, and here, except for one interval, he remained for the rest of his life. His works consist chiefly of Scriptural commentaries and sermons.

Thomar, see TOMAR.

Thomas, St., one of the 12 apostles called also Didymus (John xi. 6), i.e. 'the twin.' All the information about him in Scripture is given in the Fourth Gospel. Later tradition says that he evangelised S. India and Parthia, dying at Edessa. His feast is on 21 Dec.

Thomas, Christians of St., see NESTORIUS.

Thomas, Albert (1878-1932), see INTERNATIONAL LABOUR ORGANISATION.

Thomas, Ambroise (1811-96), Fr. composer, b. Metz, son of a musician. He studied music at the Paris Conservatoire (1828-32), winning the Prix de Rome at 21. His first operatic success was *La Double Echelle*, 1837; but the opera by which he is chiefly remembered is *Mignon*, 1866. Other famous operas are: *Song d'une Nuit d'Été*, 1850, *Raymond*, 1851, and *Hamlet*, 1868. T. also wrote numerous cantatas, part-songs, and choral pieces. He became a member of the Institute in 1851, prof. of composition in 1852, and director of the Conservatoire in 1871. See study by R. Brancour, 1914.

Thomas, Arthur Goring (1850-92), composer, b. Ratton Park, Sussex. Educ. at Haileybury College, he studied music in Paris and at the Royal Academy, London, under Froust and Sullivan. The success of his *The Light of the Harem* in 1879 led to the Carl Rosa Company's invitation to write the opera *Esmeralda*, which was successfully produced at Drury Lane (1883). His best opera is *Nadeshda*, 1885, libretto by J. Sturgis. He also composed *The Sun Worshipers* (cantata), *The Swan*, *The Skylark*, and a number of songs.

Thomas, Augustus (1857-1934), Amer. dramatist, b. St. Louis, Missouri. He studied law, then became a journalist, and was for a time owner and editor of the *Kansas City Mirror*. He wrote over 60 plays, among the most important being *Alabama*, 1891, *In Mizoura*, 1893, *The Capitol*, 1895, and *Arizona*, 1899. From 1914 to 1916 he was president of the National Institute of Arts and Letters, which awarded him its gold medal.

Thomas, Bertram Sydney, explorer and orientalist (1892-). His crossing of the Rub' al Khali, the great desert of S. Arabia, one of the largest unknown regions in the world. In the winter of 1930-1, is one of the greatest feats of exploration of the present cent. T. went with a camel caravan. He was awarded the Founders' Medal of the Royal Geographical Society and the Burton Memorial Medal of the Royal Asiatic Society. Previously, in 1927-8, he had made a 600-m. journey through the S. borderlands from the toe of Arabia nearest

India to Dhufar, and in 1929-30 he explored the steppe for 200 m. to the northward of Dhufar, right to the edge of the sands. Pub. *Alarms and Excursions in Arabia*, 1931, and *Arabia Infelix*, 1932.

Thomas, Dylan Marlais (1914-53), poet, b. Swansea. He was educ. at the grammar school there, his father being senior Eng. master. T. was a reporter for a time on the *South Wales Evening Post*, and had a number of poems printed in the *Sunday Referee*. His first book, *Eighteen Poems*, 1934, containing some surrealist verse, was praised by Dame Edith Sitwell. In 1936 he pub. *Twenty-Five Poems*, and in 1938 won a prize offered by the Chicago magazine *Poetry*. *The Map of Love*, a collection of stories and verse, appeared in 1939. Rejected for service in the Second World War, T. worked for the B.B.C. In 1940 he pub. *Portrait of the Artist as a Young Dog*, a series of humorous autobiographical sketches. *Deaths and Entrances*, 1946, and *In Country Sleep*, 1951, are considered the finest vols. of his poetry, which has affinities with the works of Blake and Gerard Manley Hopkins; his *Collected Poems* appeared in 1952. Regarded by some as the outstanding poet of his generation, he died during a lecture tour of the U.S.A. *Under Milk Wood*, 'a play for voices,' was written for radio and first broadcast in Jan. 1954. The play was pub. in London and New York in the same year, and a stage version was produced at the Edinburgh Festival, 1956, and was later seen in London. Posthumously pub. prose works are *Quite Early One Morning*, 1954, *Adventures in the Skin Trade*, 1955, and *A Prospect of the Sea*, 1955. His *Letters to Vernon Watkins* were ed. by the latter in 1957. See E. Olsen, *The Poetry of Dylan Thomas*, 1954; D. Stanford, *Dylan Thomas*, 1954; J. M. Brinnin, *Dylan Thomas in America*, 1956.

Thomas, Edward, see THOMAS, P. E.

Thomas, Freeman Freeman, see WILKINGDON, first MARQUESS OF.

Thomas, George Henry (1816-70), Amer. gen., b. Southampton co., Virginia, and educ. at W. Point Military Academy. He served in the Seminole War and the Mexican War, and was instructor at W. Point from 1851 to 1854. At the outbreak of the Civil War though a Virginian by birth he adhered to the N. cause; he was appointed colonel, and later brigadier-gen. of volunteers. In 1862 he gained the victory of Mill Springs, and distinguished himself at Perryville, Murfreesboro, and Chickamauga. From the last of those actions he gained his sobriquet 'The Rock of Chickamauga.' He was made commander of the Army at Cumberland, and fought the battle of Chattanooga in 1863. In 1864 he defeated Hood at Nashville. See lives by T. B. van Horne, 1882; D. Platt, 1893; F. Cleeves, 1948; R. O'Connor, 1948.

Thomas, Hugh Owen (1834-91), manipulative surgeon, b. Bodedern, Anglesey. He came of a family famous for generations as bone-setters. His father was unqualified, but gave Hugh the benefit of

a medical training at Edinburgh and Univ. College, London. He qualified M.R.C.S. in 1857, and in the following year practised with his father and brother in Liverpool, but in 1859 set up on his own. He soon had an immense practice, gaining invaluable experience. He endeared himself to thousands of the Liverpool poor. The methods he introduced for the treatment of orthopaedic conditions make him the true founder of orthopaedic surgery in Britain. He wrote little, and it was left to his nephew and apprentice (Sir) Robert Jones, afterwards an eminent orthopaedic surgeon, to preach the principles of T. and make them, after many years, acceptable to the medical profession. T. was a small, frail man, an inveterate smoker, who always wore a peaked cap to protect an injured eye from the light. He wrote *Diseases of the Hip, Knee and Ankle Joints*, 1875, in which he described the Thomas splint, and *Contributions to Surgery and Medicine*, 1883-90. See lives by T. P. McMurray, 1935, and D. Le Vay, 1956.

Thomas, James Henry (1874-1949), Labour politician, b. Newport, Monmouthshire, son of a labourer. As an engine-driver he was elected to the Swindon town council, and in 1904 became president of the Amalgamated Society of Railway Servants. T. was Labour M.P. for Derby 1910-36. In the First World War he was a member of Halford's mission to the U.S.A., and in 1918 became general secretary to the National Union of Railwaymen; president of the Parl. Committee of Trades Union Congress (1920-3), and president of the International Federation of Trades Unions (1920-4). Vice-chairman of the Parl. Labour Party, 1921. T. was appointed secretary of state for the colonies in the first Labour Gov., 1924, and lord privy seal and minister of employment in the second Labour Gov. (1929-30). In June 1930 he became secretary of state for dominion affairs, being transferred to the Colonial Office in 1935. In 1936 he resigned both from office and from Parliament as a result of the report of a tribunal set up to consider unauthorised disclosures relating to the Budget. T. was author of *When Labour Rules*, 1920, *The Red Light on Railways*, 1921, and *My Story*, 1937.

Thomas, Philip Edward (1878-1917), poet and essayist, b. London of Welsh parents. His father was a civil servant, and T. was educ. at St Paul's and Lincoln College, Oxford, where he studied history. His first book, *The Woodland Life*, appeared in 1897, and 2 years later, while still an undergraduate, he married Helen Noble. They lived in poverty in various parts of Kent while he tried to make a living by his books and by hack journalism. On the outbreak of the First World War he enlisted as a private, but had received his commission as a second lieutenant when he was killed at Arras. An intense love of the country is shown in his works, which include *Oxford*, 1903, *Beautiful Wales*, 1905, *The Heart of England*, 1906, *The South Country*, 1909,

The Isle of Wight, 1911, *The Icknield Way*, 1913, *The Country*, 1913, and *A Literary Pilgrim in England*, 1917. T. wrote no poetry till 1912, when he used the pseudonym Edward Eastaway; his *Collected Poems*, 1920, in a style limpid and fastidious, were praised by Walter de la Mare. T. also pub. studies of Richard Jefferies, 1909, Maeterlinck, 1911, Swinburne, 1912, Borrow, 1912, Pater, 1913, the Duke of Marlborough, 1915, and Keats, 1916. *The Happy-Go-Lucky Morgans*, 1913, is a novel. See Helen Thomas, *As It Was*, 1926, and *World Without End*, 1931; also studies by J. J. Guthrie, 1937, and J. C. Moore, 1939.

Thomas, Sir (William) Miles (Webster) (1897-), industrialist and administrator, educ. at Bromsgrove School. He was trained as an engineer, and after serving in the First World War had a successful career in the motor industry. He was chairman of the colonial development corporation 1948-51. In 1949 he became chairman of H.O.A.C., his appointment being an outstanding success. Subsequently he returned to private industry. He was knighted in 1943.

Thomas & Kempis, see KEMPIS.

Thomas & Baldwins Ltd., Richard, iron, steel sheet, and tinplate manufacturers. In 1945 Richard Thomas & Co. (registered 1884) purchased the assets of Baldwins Ltd. (registered 1902) and was renamed R. T. & B. Ltd. Previously in 1938 Richard Thomas brought into operation at Ebbw Vale the first continuous wide strip mill outside the U.S.A. The company now has an ann. steel output of nearly 2,000,000 tons, and employs over 25,000 people. In addition to steel sheets and tinplates, the company manufactures alloy and stainless steels, and special-quality silicon sheets for the electrical industry.

Thomas Aquinas, or Thomas of Aquino, see AQUINAS, THOMAS.

Thomas Becket, see BECKET, THOMAS.

Thomas of Celano, see CELANO.

Thomas of Woodstock, see GLOUCESTER, DUKES AND EARLS OF.

Thomas the Rhymer, see ERCILDOUNE.

Thomas van Erpe, see ERPE.

Thomasius, Christian (1655-1728), German jurist, b. Leipzig, where he began to lecture on law in 1684. In 1687 he took the daring step of lecturing in German instead of Latin, and in the following year sided with the Pietists in their controversy with the orthodox through the columns of a monthly periodical, *Comic and serious, etc. Thoughts on all manner of merry and useful books*, 1688-9. He removed to Halle (1690), where he founded a university (1694). See works on T. and his life, by H. Dernburg, 1865; B. A. Wagner, 1872; E. Landsberg, 1894.

Thompson, Alice, see MEYNELL, ALICE.

Thompson, Sir Benjamin, Count Rumford (1753-1814), Anglo-Amer. scientist and administrator, b. Woburn, Mass., his family having settled in New England. Early made chemical and mechanical experiments and, by turns, studied

medicine and took up school teaching. At 19 he married the well-to-do widow of a Colonel Rolfe, and daughter of a minister who had settled at Rumford, now called Concord. This marriage was the foundation of his success, though within a few years he left his wife to settle in Europe. During the war of Amer. Independence his sympathies were opposed to the Amer. cause, and in 1776 he was therefore chosen by Governor Wentworth of New Hampshire to bear dispatches to London and later became an under-secretary of state. His official duties, however, did not preclude scientific pursuits, and in 1779 he was elected a fellow of the Royal Society. Among the subjects of which he made special study were ballistic experiments, a differential thermometer, and lighthouse improvements; but he is chiefly noted for his researches in heat, the caloric notion of which was rejected when he noticed that the metal chips from the boring of a cannon were very hot. A few years later he was introduced to Prince Maximilian, afterwards elector of Bavaria, and entered the service of that state as minister of war, grand chamberlain, and principal adviser to the elector. In 1791 he was created a count of the Holy Roman Empire, choosing his title of Rumford from his Amer. associations. In 1795 he again visited England and devoted himself to the problems of smoke abatement. In 1799 he co-operated with Sir Joseph Banks in projecting the estab. of the Royal Institution. T. himself elected Sir Humphry Davy as the first scientific lecturer there. He was the founder and first recipient of the Rumford Medal of the Society. His complete works were pub. by the Amer. Academy of Arts and Sciences at Boston in 1872.

Thompson, Dorothy (1894-), Amer. journalist, b. Lancaster, New York state. Educ. at Syracuse Univ. and Vienna, she became a journalist and from 1920 to 1928 was a foreign correspondent in Europe. Later she was political commentator on the New York *Herald Tribune*, and wrote a syndicated column entitled 'On the Record.' Her books include *The New Russia*, 1928, *I Saw Hitler*, 1937, *Refugees*, 1938, *Let the Record Speak*, 1939, and *Listen, Hans*, 1942. Her first 2 marriages, to Josef Bard, a Hungarian novelist, and to Sinclair Lewis (q.v.) ended in divorce, and in 1943 she married Maxim Kopf. She was given honorary degrees by 6 univs.

Thompson, Sir Edward Maunde (1840-1929), librarian and palaeographer, b. Jamaica; educ. at Rugby and Univ. College, Oxford. He was a co-founder of the Palaeographical Society (1873), of which he became president in 1903. T. was keeper of the MSS. and Egerton Librarian (1878), Director and Prin. Librarian of the Brit. Museum (1888-1909). His chief works are *Handbook of Greek and Latin Palaeography*, 1903, *An Introduction to Greek and Latin Palaeography*, 1912, and *Shakespeare's Handwriting*, 1916. He ed. and pub. a number of MSS. from the Brit. Museum, and was joint editor of pubs. of the Palaeographical

Society, and of the *Facsimile of the Laurentian Sophocles*.

Thompson, Elizabeth, see BUTLER, ELIZABETH SOUTHERDEN, LADY.

Thompson, Flora (1877-1948), novelist, b. Juniper, Oxon. She became assistant in a post office, and her love of rural life is shown in her autobiographical novels *Lark Rise*, 1939, *Over to Candleford*, 1941, and *Candleford Green*, 1943, forming a trilogy later pub. as *Lark Rise to Candleford*, 1945. Other works are *Bog Myrtle and Peat*, 1921, a vol. of verse, and *Still Glides the Stream*, 1948.

Thompson, Francis (1860-1907), poet, b. Preston, Lancs. He was educ. at Ushaw College, near Durham, and afterwards studied medicine at Owens College, Manchester, but failing to take a degree, he sought his fortune in London. Here he spent some years in various occupations, until in 1893 he sent a poem to the magazine *Merrie England*. This was recognised by Wilfrid Meynell as a work of merit; he rescued T. from destitution and helped him to publish his first vol. of *Poems*, which were praised by Coventry Patmore in the *Fortnightly Review*. This vol. was followed by *Sister Songs*, 1895,



Burns Oates & Washbourne
FRANCIS THOMPSON

and *New Poems*, 1897, both of which gave him a recognised place among poets. The most famous of his poems is 'The Hound of Heaven.' He also gained a reputation as a prose writer, and pub. *Health and Holiness*, 1905, a treatise dealing with the ascetic life; an *Essay on Shelley*, 1909; and *Lives of St Ignatius Loyola*, 1909, and John Baptiste de la Salle, 1911. *The Works of Francis Thompson* in 3 vols. were pub. in 1913; *Collected Poetry* in 1924. See J. Thompson, *Francis Thompson, Poet and Mystic*, 1923; E. Meynell, *The Life of Francis Thompson*, 1926; R. L. Mégroz, *Francis*

Thompson, Poet of Earth in Heaven, 1927; also lives and studies by F. Olivero, 1935 (Eng. trans. 1938), and T. L. Conolly, 1944.

Thompson, Sir Henry Francis Herbert (1859-1944), Egyptologist, son of Sir Henry T., educ. at Marlborough School and Trinity College, Cambridge. He studied law and biology, but at 40 found his true bent in Egyptology and became the leading Demotic scholar of his day. He founded the chair of Egyptology at Cambridge.

Thompson, Sylvia Elizabeth (1902-), novelist, b. Scotland. Educ. at Cheltenham and Somerville College, Oxford, she married Theodore D. P. Luling, an Amer. artist, in 1926. Her first novel, *Rough Crossing*, was pub. when she was 16, and *The Hounds of Spring*, started when she was an undergraduette, was a best-seller in 1925. Others of her novels are *The Battle of the Horizons*, 1928, *Chariot Wheels*, 1929, *Winter Comedy*, 1931, *Summer's Night*, 1932, *Helena*, 1933, *Golden Arrow*, 1935, *Recapture the Moon*, 1937, *The Gulls Fly Inland*, 1941, *The People Opposite*, 1948, and *The Candle's Glory*, 1953.

Thoms, William John (1803-85), antiquary and miscellaneous writer, b. Westminster, was for some years a clerk in the secretary's office of Chelsea Hospital, and was appointed Clerk in 1845, and subsequently deputy librarian to the House of Lords. He was founder in 1849 of *Notes and Queries*, which for some years he also edited. He also ed. Stow's *London*, 1842, and was secretary of the Camden Society. He introduced the word 'folklore' into the language.

Thomsen, Grimur (1820-96), Icelandic diplomatist, politician, and poet. For about 20 years he was in the service of the Dan. Foreign Office (London and Brussels), but after 1866 he permanently resided in Iceland. He stands in the front rank of Icelandic poets, and for the foreign student he is the easiest of them all to read. Many of his subjects are taken from Saga times, and his *Buarimur* is the greatest epic in the Icelandic language. His translations of the Gk dramatists are unequalled in Icelandic.

Thomsen, Hans Peter Jørgen Julius (1826-1909), Dan. chemist, passed his life in Copenhagen, teaching chemistry at the Polytechnic (1847-56) and Military High School (1856-66), before he was appointed to the chair of chemistry in the Univ. (1866-91). He was awarded the Davy Medal in 1883 and became a member of the Royal Society in 1902. His name is famous for his work on thermochemistry. *Thermochemistry*, 1908, is an abstract of his *Thermochemische Untersuchungen*, 1882-6.

Thomson, Sir Charles Wyville (1830-82), zoologist, b. Bonny-side, W. Lothian; educ. at Edinburgh Univ., he became prof. of zoology at Cork, at Belfast, and, from 1870, at Edinburgh. He is chiefly remembered as director of the scientific staff in the *Challenger Expedition* (1872-6). This appointment he owed to his important studies of biological conditions

in the depths of the sea made in 2 expeditions in H.M.S. *Lightning* and *Porcupine* with Dr W. B. Carpenter in 1868-9. Knighted in 1876. He wrote *The Depths of the Sea*, 1872, and *The Voyage of the Challenger*, 1877.

Thomson, Elihu (1853-1937), Anglo-Amer. inventor, b. Manchester, and moved to the U.S.A. with his parents while a child. He was educated at the Central High School in Philadelphia. From 1875 to 1880 he was prof. of mechanics and chemistry at this institution. From 1880 he was chief electrician for the Thomson-Houston Co. and the General Electric Company, which under his inventions operate more than 600 patents. Besides numerous inventions in electric lighting and generator design, he was the discoverer of the method of electrical welding. He was the first to utilise a magnetic field to move an electric arc, made the first high-frequency alternator, invented a watt-hour meter, and was the first to make stereoscopic X-ray pictures. He was presented with medals by most of the great societies of the world.

Thomson, Sir George Paget (1892-), physicist, b. Cambridge, the son of Sir J. J. Thomson, who first identified the electron. Elected a fellow of Corpus Christi College, Cambridge, in 1914, he served in France 1914-15, and worked on aerodynamical problems from then until 1919, when he returned to Cambridge. From 1922 to 1930 he held the chair of Natural Philosophy at Aberdeen, and in 1930 was appointed prof. of physics at the Imperial College of Science and Technology, S. Kensington. He has been Master of Corpus Christi College, Cambridge, since 1952.

De Broglie's view that electrons possess not merely the properties of discrete particles but also have many of the attributes of wave motion was strongly supported by experiments performed by T., who in 1937 and 1939 respectively was awarded the Nobel Prize for physics, and the Hughes Medal of the Royal Society, of which he was elected a fellow in 1929. He was a member of the Aeronautical Research Committee 1937-41, and in 1943-4 acted as scientific adviser to the Air Ministry. From 1946 to 1947 T. was scientific adviser to the Brit. delegation to the Atomic Energy Commission of the U.N. His pubs. include *Applied Aerodynamics*, 1919, *Wave Mechanics of the Free Electron*, 1930, *The Atom*, 1937, and *The Theory and Practice of Electron Diffraction*, 1939, with W. Cochran.

Thomson, Hugh (1860-1920), illustrator, b. N. Ireland. He made a special study of the 18th and early 19th cents., illustrating, with fidelity to modes and atmosphere, Goldsmith's *Vicar of Wakefield*, Elizabeth Gaskell's *Cranford*, J. M. Barrie's *Quality Street*, and all the works of Jane Austen, Thackeray, Austin Dobson, and others. In contemporary subjects 'Highways and Byways in London,' 1902, shows him at his best. A delightful pen-and-ink draughtsman, he carried on the tradition of Randolph Caldecott.

Thomson, James (1700-48). Poet, b. Ednam in Roxburghshire. He was educ. at Edinburgh Univ., where he occupied his leisure in writing great quantities of verse, of which 3 poems appeared in the *Edinburgh Miscellany* of 1720. He had originally some intention of entering the ministry, but he abandoned all thought of this, and in 1725 went to London to pursue a literary career. He became a tutor to Thomas Hamilton (afterwards 7th Earl of Haddington), and made the acquaintance of many of the leading men of letters. He pub. in 1726 *Winter*, which was highly applauded, and this he followed in the next year with *Summer*. *Spring* appeared in 1728, and 2 years later he repub. these 3 poems, adding to them *Autumn*, under the title of *The Seasons*. He subsequently carefully revised this work, but it was not brought out in its amended form until 1744. T. in 1730 had his play *Sophonisba* produced at Drury Lane, but in spite of its many merits, it was not successful. In 1731 he accompanied the son of Lord Chancellor Talbot on the 'grand tour.' This inspired the poem *Liberty*, 1734. *Agamemnon*, 1738, was his next work, and in 1740, in collaboration with David Mallet, he wrote *The Masque of Alfred*, which is famous because in it first appeared the ode 'Rule Britannia.' It is virtually certain that T. was the author of 'Rule Britannia,' though Mallet's claims to it have been discussed. Since 1738 T. had been in receipt of a pension from Frederick, Prince of Wales, and in 1744 he was given by Lyttelton the sinecure office of surveyor-general of the Leeward Is. His later works include the plays *Edward and Eleonora*, 1739, *Tancred and Sigismunda*, 1745, in which Garrick played Tancred, and *Coriolanus*, 1748. *The Castle of Indolence*, 1748, an allegorical poem in the Spenserian stanza, is often reckoned his finest work. He was buried in Richmond church. When T. began to write, Eng. poetry was dominated by artificiality, and Pope was the prin. living poet; but T. employed a true, simple, romantic treatment of nature, and his influence on his contemporaries, as on his successors, was considerable. T.'s *Works* were first collected in 1763. The poetical works were ed. by J. L. Robertson, 1908. *See* lives by R. Shiels, 1753; S. Johnson, 1781; G. C. Macaulay, 1908.

Thomson, James (1822-92), physicist, b. Belfast, was also an engineer, inventor, and geologist. He was prof. of civil engineering at Belfast (1857-73) and Glasgow (1873-89), and was the first to demonstrate the possibility of lowering the freezing point of water, etc., by pressure.

Thomson, James (1834-82), poet, b. Port Glasgow. Educ. at the Royal Caledonian Asylum and the Military Asylum, Chelsea, he became a schoolmaster in Ireland and then an army teacher in Dublin, Aldershot, and Portsmouth, but was discharged in 1862 for a breach of discipline. Moving to London, he worked as clerk and journalist, writing under the initials B. V. for Bysshe

Vanolis, a combination of Shelley's middle name with an anagram of Novalis, the Ger. poet. In 1874 he contributed to the *National Reformer* his best-known poem, 'The City of Dreadful Night,' which made him famous as the poet of pessimism and despair. It was pub. along with some other pieces in 1880, and in 1881 a second vol. of verse and a collection of essays appeared. *See* study by I. Walker, 1950.

Thomson, Sir John Arthur (1861-1933), naturalist, b. E. Lothian. Educ. at the univs. of Edinburgh, Jena, and Berlin. Sometime lecturer in zoology and biology in the School of Medicine, Edinburgh, he was also Regius prof. of natural hist., Aberdeen, 1899-1920. Author of: *Study of Animal Life*, 1892 (rev. 1917), Herbert Spencer, 1906, *Darwinism and Human Life*, 1910 (rev. 1916), *Biology of Birds*, 1923, *Science and Religion*, 1925; *Outline of Biology*, 1930; *Biology for Everyman*, 1934. He was knighted in 1930.

Thomson, Sir Joseph John (1856-1940), physicist, b. near Manchester, eldest son of J. J. Thomson. Educ. at Owens College and Trinity College, Cambridge, where he was Second Wrangler and second Smith's Prize, 1880. Lecturer at Trinity College, 1883, and Master of Trinity College and Prof. of Physics, his association with Cambridge lasted throughout his life. In 1884 he succeeded Lord Rayleigh as Cavendish Prof. of Experimental Physics (1884-1918). To T. belongs, by general consent, the credit for the discovery of the electron. His book, *Application of Dynamics to Physics and Chemistry*, 1888, was to a great extent the foundation-stone on which the study of physical chemistry was built. This was followed by numerous papers on electrical theory and experiments on gases. After Röntgen had demonstrated the existence of X-rays produced by substances struck by cathode rays, T. (assisted by Rutherford, then a young research student from New Zealand) adapted the discovery to his own use and used the X-rays for producing more controllable ionised gas. Through his researches in this field he concluded that all matter is composed of electrically charged particles and that electricity is atomic in nature. His subsequent researches into the nature of electricity resulted in the development of the study of atomic physics, in which T. as a pioneer, gained international recognition from the scientific world and in 1906 he gained the Nobel Prize for Physics. In 1912 he was awarded the O.M. and was president of the Royal Society from 1916 to 1920. His pubs. include *On the Motion of Vortex Rings*, 1883, *Application of Dynamics to Physics and Chemistry*, 1888, *Elements of the Mathematical Theory of Electricity and Magnetism*, 1895, *The Discharge of Electricity through Gases*, 1898, *The Conduction of Electricity through Gases*, 1903, *Corpuscular Theory of Matter*, 1907, *Thermochemistry*, 1915, and *The Electron in Chemistry*, 1923. *See* life by Lord Rayleigh, 1942.

Thomson, William, see KELVIN, BARON.

Thomson Effect, or **Kelvin Effect**, see **THERMOELECTRICITY**.

Thonon (-les-Bains), Fr. tn, cap. of an arron., in the dept of Haute-Savoie, on Lake Léman. It was the anct cap. of Chablais (q.v.). It is a popular spa, and manufs. cheese and other foodstuffs. Pop. 13,200.

Thor, god of thunder, see **MYTHOLOGY (Teutonic)**.

Thoracic Duct, duct which conveys the greater part of the lymph and chyle into the blood. It is the common lymph trunk of the body except for the right upper extremity, right side of the head, neck, and thorax, right lung, right side of the heart, and convex side of the liver. It does not, as its name would seem to imply, lie wholly within the thoracic cavity, but begins in the abdomen, on the front of the body of the second lumbar vertebra, by a dilatation known as the *receptaculum chyli*. It reaches the thorax by passing through the aortic openings in the diaphragm, passes upwards to the root of the neck, and then takes a curved course outwards and downwards, emptying itself into the left subclavian vein at its junction with the left internal jugular vein. The duct measures, in the adult, between 15 and 20 in. in length.

Thorarensen, Bjarni (1786-1841), Icelandic poet of the Romantic school. Though with the exception of some 20 poems he is no longer widely read, these suffice to make him immortal.

Thorarensen, Jakob (1886-), Icelandic poet who has inherited some of the force of his older kinsman, B. Thorarensen. His themes are largely drawn from everyday life, and he is little affected by modern fashions.

Thorax, see **CHEST**.

Thordarson, Thorbergur (1888-), Icelandic prose writer of the Rabelaisian type. He is entertaining, and his books are popular.

Thoreau, Henry David (1817-62), Amer. naturalist and author, b. Concord, Massachusetts, of mixed Scottish and Fr. descent. T. passed through school and Harvard Univ. without gaining any distinction. The 2 famous years of his life were those he spent as a recluse in his self-made shanty in the woods near Walden Pond (1845-7), and it is his *Walden*, or *Life in the Woods*, 1854, which reveals his curious and arresting originality. Here he lived happily on a bare pittance, indulging to the full his sympathies with bird and beast, and giving free rein to his fresh and noble but rather egotistic thoughts. Other writings are *A Week on the Concord, 1849, Excursions* (pub. posthumously, 1863), *The Maine Woods*, 1864 and *Cape Cod*, 1865. The standard ed. is the Riverside, 10 vols., 1894-5; there is also a collection (*Journal omitted*), *The Works of Thoreau*, ed. by H. S. Canby, 1947. See H. A. Page, *Thoreau, his Life and Aims*, 1878; also lives by F. B. Sanborn, 1882; H. S. Salt, 1890; F. H. Allen, 1908; J. B. Atkinson, 1929; W. White, 1939; J. W. Krutch, 1948.

Thorez, Maurice (1900-), Fr. politician, b. Noyelles Godault, Pas de Calais,

son of a coalminer. He joined the Communist party in 1920, and was its leader from 1936 to 1939. A military tribunal condemned him in absence for avoiding military service at the outbreak of the Second World War. He spent some time in Moscow, returning in 1944 to become a member of the consultative assembly and a minister of state under de Gaulle. He held various cabinet offices until 1947, when Auriol removed Communist ministers after they had opposed the gov. of which they were a part. Since that date T. has led Fr. Communist opposition to alliances, military or economic, with other W. European countries.

Thorium, metallic element, symbol Th, atomic weight 232.2, atomic number 90. T. was discovered by Berzelius in 1828, and is obtained commercially from the monazite sand of Brazil, Malay, Travancore, etc. Thorium oxide, ThO₂, is extracted from the sand, and is used in the preparation of incandescent gas-mantles. Metallic T. is difficult to isolate, owing to its chemical activity, but it has been prepared pure by strongly heating thorium chloride with sodium in a vacuum. It is a white metal, melting at over 1800° C. When heated in air or oxygen it burns brilliantly. T. is radioactive, thorium atoms gradually disintegrating to mesothorium, thorium-x, thorium emanation, and so on, a final product which is one of the isotopes of lead. Helium is also given off.

Thorkelsson, Jón (1859-1924), Icelandic scholar and poet. He organised the National Archives of Iceland, and specialised in the unpub. MSS. of the 15th-17th cents.

Thorláksson, Gudbrandur (1542-1627), Icelandic prelate and translator of the Bible, which he pub. in 1584, the first complete Icelandic ed. He was bishop of the N. see (Hólar) for 56 years and estab. the Lutheran reformation in Iceland on a secure basis. His is one of the great names in the hist. of Iceland. See P. E. Ólason, *Menn og mentir*, vol. III, and his *Saga Íslendinga*, vol. v.

Thorláksson, Jón (1744-1819), Icelandic clergyman and poet who holds a high place in the literature of his country. Among his numerous and able translations are Pope's *Essay on Man*, Milton's *Paradise Lost*, and Klopstock's *Messias*. See Sir Wm Craigie in the *Oxford Book of Scandinavian Verse*, 1925.

Thorláksson, Þórður (1637-97), Bishop of the S. diocese of Iceland (Skálholt), a man of great and varied learning. He was the first to have any of the sagas printed in Iceland (*Landnámabók*, 1688). His own most important work is *Dissertatio chorographico-historica de Islandia*, Wittenberg, 1666. He was also a cartographer. See H. Hermannsson, *Islandica*, vol. xvii, 1926.

Thorn is the name of the O. E. letter, þ, pronounced th. Its form gradually became the same as y, which appears in antique spelling of the definite article as 'ye,' often mistakenly pronounced like the plural of 'you' in pseudo-ancient phrases like 'Ye olde tea shoppe.'

Thorn, *see* TORUN.

Thorn Apple, *see* DATURA.

Thornaby-on-Tees, municipal bor. of Yorks (N. Riding), England, on the Tees, 3 m. WSW. of Middlesbrough. Stockton-on-Tees, co. Durham, is on the opposite bank of the riv. The bor.'s prin. industries are engineering, bridge-building, iron founding, flour milling, sugar refining, and wire rope manuf. Pop. 24,000.

Thornidge, Dame Sybil (Lady Lewis Thomas Casson) (1882-), actress, b. Gainsborough, Lincs, daughter of Arthur John Webster T., hon. canon of Rochester. Educ. at Rochester High School. With her brother, she joined Ben Greet's Academy, her first professional appearance being in 1904 at Cambridge. After touring in America for 4 years, she was with Miss Horniman's Manchester Co., 1908-9. Married in 1908, she joined the Chas. Frohmann repertory 1910, and made an Amer. tour with John Drew, 1910-11. From 1914 to 1918 she played leading rôles at the Old Vic, and at the Little Theatre from 1920 to 1922. Her creation of the title rôle in Shaw's *St Joan* in 1924 gained her wide recognition. Her range and quality have been shown in the classical parts of Lady Macbeth, Medea, and Lady Teazle, in *Peer Gynt* as Aase and in *The Linden Tree*. She is the leading tragedienne of the present-day Eng. theatre. D.B.E. 1931.

Thorne, market tn and rural dist. in the W. Riding of Yorks, England, on the R. Don, with barge-building, mining, engineering, and textile industries. Pop. of rural district 33,000; area, 38,419 ac. Pop. of tn about 15,000.

Thornycroft (George Edward) Peter (1909-), politician, educ. at Eton and the R.M.A., Woolwich. He resigned his commission in 1933 and was called to the Bar, 1935. From 1938 to 1945 he was Conservative M.P. for Stafford, and became Conservative M.P. for Monmouth in 1945. After the Conservative defeat in 1945, T. became a prominent Opposition speaker, his views being considered progressive within his own party. From 1951 to 1957 he was president of the Board of Trade, and in the Macmillan Gov. was appointed Chancellor of the Exchequer. T. resigned the chancellorship in Jan. 1958 after a disagreement with the rest of the Cabinet over the budget estimates, 1958-9. T. was not prepared to approve estimates any higher than the sum spent 1957-8. He was succeeded as chancellor by Derick Heathcoat Amory (q.v.), the then minister of agriculture.

Thornhill, Sir James (1676-1734) painter, b. Melcombe Regis, Dorset, and studied under Hogarth. He was much employed by Queen Anne, who commissioned him to paint the interior of the dome of St Paul's, and the princesses' apartments at Hampton Court. T.'s other decorative works include the great hall at Greenwich Hospital, the hall at Blenheim, and paintings in Kensington Palace. He also painted altar-pieces for All Souls and Queen's College chapels, Oxford, and portraits of Sir Isaac Newton

and Steele. He founded a school of art in Covent Garden, attended by Hogarth, who became his son-in-law. T. (long undervalued) was a very able practitioner of the 'baroque' style of decorative painting.

Thornhill: 1. Suburb of Dewsbury (q.v.).

2. Picturesque vil. of Dumfriesshire, Scotland, 15 m. N. of Dumfries. Near it are Drumlanrig Castle, seat of the Duke of Buccleuch and Queensberry; and Maxwelltown House, bp. of Annie Laurie. There is trout and salmon fishing. Pop. 1200.

Thornton, vil. 4 m. S. of Fleetwood, on the Wyre, in Lancs, England. It is now joined with the seaside resort of Cleveleys to form the urban dist. of Thornton Cleveleys. Pop. 15,080.

Thornycroft, Sir John Isaac (1843-1928), naval architect, b. Rome, eldest son of Thomas and Mary T., sculptors. A draughtsman in Palmer's shipbuilding yard in Glasgow, he studied under Lord Kelvin and Macquorne Rankine at the univ. and later worked for John Elder, marine engineer. He estab. at Chiswick (1866) a yard for launches and torpedo-craft, and built the first torpedo-boat of the R.N. in 1877. In 1898 he began motor-building at Basingstoke; in 1906 he moved his boatyard to Woolston, Southampton. He supplied the Admiralty during the First World War; in 1893 he became a fellow of the Royal Society, and was knighted in 1902.

Thornycroft, Sir William Hamo (1850-1925), sculptor, b. London, son of the sculptor, Thomas T. (1815-85). He studied sculpture at the R. A. Schools and helped his father with the Park Lane Fountain (removed in 1948) 1872, contributing Comedy, Shakespeare, and Fame. He won R.A. gold medal, 1875. Other works include 'Teucer', 1881 (Tate Gallery); 'The Mower', 1884 (Walker Art Gallery, Liverpool); statue of Cromwell in front of the Houses of Parliament, and Gordon's statue in Trafalgar Sq. He was knighted in 1917.

Thoroddson, Jón (1818-68), Icelandic poet, novelist, and administrator. He ranks as one of the country's greatest novelists. *Lad and Lass* has been trans. into Eng. (1890).

Thoroddson, Thorvaldur (1855-1921), son of Jón T., Icelandic geologist and geographer. Among his works are *Island, Grundriss der Geographie und Geologie*, and *Geschichte der Isländischen Vulkane*. See H. Hermannson's *Catalogues*; also an autobiography in Icelandic, which the author did not live to complete.

Thorough-Bass (actually the old spelling of Through-B.), system of shorthand notation used by composers for keyboard instruments during the early part of the 17th cent. and persisting until about the middle of the 18th. Composers, instead of writing out the full harmony they required often contented themselves with setting out only the chief melodic parts over a single bass-line, under which they wrote figures indicating what the harmony above that bass was to be, but not how

it was to be spaced or distributed, much less giving any indication as to how it might be broken up into figuration or made more interesting by such devices as suspensions or passing-notes, all of which was left to the ingenuity of the player at the harpsichord or organ, who was expected to improvise an interesting part to amplify the music with a background of texture and harmony. T.-B.s were not always completely figured, and sometimes not at all, which made the *continuo* player's task more difficult.

Thoroughbred, see HORSE.

Thorow-wax, see BUPLEURUM.

Thors, Thor (1903-), Icelandic lawyer, politician, and diplomatist, ambassador in Washington, and permanent representative to the U.N. since 1946.

Thorshavn, cap. of the Faeroe Is., situated on the SE. coast of Strömø. To the E. of Eystaravag are the remains of an ancient fortress, parts of which serve as prison and lighthouse. The prin. buildings are the church, the Parliament building, the governor-general's house, the library (and museum), and the theatre. Pop. 4400.

Thorsteinsson, Steingrímur (1831-1913), Icelandic poet. Few poets have been so universally loved in Iceland in their lifetime as he was. He was a great translator. His masterly translation of the *Arabian Nights* shows both the wealth and the beauty of the Icelandic language. T.'s satirical epigrams in the Rom. style are matchless.

Thorwaldsen, Bertel (1770-1844), Dan. sculptor, b. Copenhagen, son of a poor wood-carver. He studied for a while in the school of art in his bp., and subsequently went to Italy, where he was influenced by Canova and where he remained for 23 years. On his return to Denmark in 1819 he was commissioned to execute a group of colossal figures of 'Christ and the 12 Apostles' for the Fruekirche in Copenhagen. Soon after his death a permanent exhibition of his work was formed at Copenhagen, while his statue of Byron is now at Trinity College, Cambridge. The Lion of Luzern (see LUZERN) is also his work. Thorwaldsen estab. an international reputation during his life-time, and examples of his monumental sculpture may be seen on buildings and in churches all over Europe. His art was dominated by classical Gk and Rom. sculpture, and his artistic achievement is one of successful imitation and of skill rather than creative vision. See *lives* and studies by J. M. Thiele, 1852-6; A. Rosenberg (2nd ed.), 1901; E. E. Douglas, 1933.

Thoth, early Egyptian deity of knowledge and magic. He invented writing, and was the patron of scribes. T. was represented by a baboon or that persistent searcher, the ibis, and associated with the moon, whose phases were used for reckoning. Hermopolis (Ashmunein) was the centre of the cult. With Horus, T. was chief lustrator of Osiris. He accompanied the sun god in his boat, and recorded the result of the weighing of the heart of the dead.

Thothmes, Tuthmosis, or Tehutmes name of 4 kings of ancient Egypt, who belong to the 18th dynasty; *Thothmes I* (c. 1530 bc) finally subdued Cush or Nubia, fixed the boundary of his kingdom at the fifth cataract, and made successful campaigns as far as the Euphrates. He enlarged the Theban temple of Amun or Amen at Thebes (q.v.), which gradually became the largest temple in the world. He was the first king to be interred in the valley of the tombs of the kings at Thebes. *Thothmes II*, his son, reigned less than 3 years. *Thothmes III*, the son of Thothmes II, did little till the death of his aunt and wife, the despotic Queen Hatshepsut. He fought successful campaigns in revolted Syria and Mesopotamia, secured the Phoenician ports, and received ann. tribute from Nubia, Crete, Cyprus, and the Aegean Is. He built a large number of temples, his greatest work being the colonnade at Karnak, and set up sev. magnificent obelisks. His conquests enriched the country, and he proved an efficient administrator. He d. at a very advanced age. *Thothmes IV* was a grandson of Thothmes III; he married a Mitanni princess, and ruled till about 1405.

Thou (or Thuanus), Jacques Augusta de (1553-1617), Fr. historian, b. Paris. He gained the favour of Henry III and Henry IV and helped to draft the Edict of Nantes (1598). He wrote a *Historia sui temporis*, 1604-8, which has considerable historical value.

Thouars, Fr. tn in the dept of Deux-Sèvres, on the Thouet. It is a picturesque tn with many ancient buildings, including a fine château. It has an important agric. mrkt. Pop. 10,400.

Thought Reading, see PSYCHICAL RESEARCH; TELEPATHY.

Thousand and One Nights, see ARABIAN NIGHTS.

Thracia, or Thrace, was in earlier times the name of the vast tract of country bounded on the N. by the Danube, on the S. by the Propontis and the Aegean, on the E. by the Pontus Euxinus, and on the W. by the R. Strymon and the easternmost of the Illyrian tribes. It was divided into 2 parts by Mt Haemus (the *Balkan*), running from W. to E., and separating the plain of the lower Danube from the rivs. which fall into the Aegean. At a later time the name T. was applied to a more limited area. T. in its widest extent, was peopled at the time of Herodotus and Thucydides by different tribes. The earliest Gk poets and other cultural pioneers are represented as coming from T., which received Gk colonies at an early date. The first really historical fact respecting the Thracians is their subjugation by Megabazus, the gen. of Darius. After the Persians had been driven out of Europe by the Greeks, the Thracians recovered their independence; and at the beginning of the Peloponnesian war almost all the Thracian tribes were united under the dominion of Sitalces, King of the Odrysae, whose kingdom extended from Abdera to the Euxine and the mouth of the Danube. Sitalces fell in

battle against the Triballi in 424, and was succeeded by his nephew Seuthes, who raised his kingdom to a height of power and prosperity which it had never previously attained. Philip, the father of Alexander the Great, reduced the greater part of T.; and after the death of Alexander the country fell to the share of Lysimachus. It subsequently formed a part of the Macedonian dominions. T. was the centre of disturbances in more modern times. It was one of the theatres of war in the Balkan war of 1912, when the Bulgarians entered it and defeated the Turks. With the help of the Serbs Bulgaria took Adrianople, and nearly all T. was given to Bulgaria by the treaty of London signed in 1913. However, quarrels with her allies about the div. of the conquered ters. led to the second Balkan war in 1913, when the Turks recaptured Adrianople and re-occupied Thrace. The treaty of 1913 gave Bulgaria her outlet to the Aegean Sea through Thrace. In 1919, after the First World War, the boundary was again changed, and the sea coast given to Greece, which obtained most of Thrace by 1920. In 1923 the treaty of Lausanne provided for the giving up to Turkey of E. Thrace as far as the Maritza, and W. Thrace, except Karagach, was given to Greece. Thrace in Greece has an area of 3315 sq. m., and is divided into 3 nomes—Hevros, Rhodope, and Xanthe, total pop. (1940) 360,000. Alexandroupolis, Komotini, and Xanthe are the respective caps. E. Thrace, or Turkey-in-Europe, has an area of 9256 sq. m. and a pop. of 1,626,000. It includes the cities of Istanbul and Edirne. Gk Thrace was occupied by Germans and Bulgarians in 1941 and annexed to Bulgaria until the 1944 armistice. During this period attempts were made to give the area a Bulgar character, these activities contributing to much unrest during the period immediately following the Second World War. See A. J. Toynbee and others, *The Balkans*, 1915; F. Schevil, *The Balkan Peninsula*, 1922; *Treaty of Peace with Turkey, signed at Lausanne, July 24th, 1923*, 1923; S. Casson, *Macedonia, Thrace, and Illyria*, 1926; *Cambridge Ancient History*, vol. 8, 1930.

Thraco-Illyrian Languages, see INDO-EUROPEAN LANGUAGES.

Thrale, Henry (1728–81), Brit. brewer. He inherited his father's brewery in 1758 and in 1763 married Hester Lynch Salusbury, 'of good Welch extraction, a lady of lively talents, improved by education' (Boswell). T. and his wife were for long hosts of Dr Johnson at their home at Stroatham Park. Three years after T.'s death, Mrs T. married Gabriel Piozzi, a musician (see also Piozzi, **HESTER LYNCH**).

Thrale, Hester Lynch, see PIOZZI.

Thrasea, Paetus P. (d. AD 66), Rom. senator and Stoic philosopher in the reign of Nero, a native of Patavium. He made the younger Cato his model, of whose life he wrote an account. After incurring the hatred of Nero, he took his life by command of the emperor. See **ARRIA**.

Thrashing, or Threshing, separation of the grain from the straw, or the seed from the hawl. Formerly the operation was performed by the flail, and this laborious but effective implement is still occasionally used by seed growers and on small holdings. The first workable threshing machine was invented by Andrew Meikel about 1786; the modern machine, besides effectively sorting out the products of the sheaf, delivers the straw unbroken and ready for trussing. The machine was at first worked by hand, then by portable steam engines which were drawn from farm to farm by horses until they were superseded by self-propelled steam engines. These, in turn, were followed by tractors, those with Diesel engines appearing to be the most suitable. Water power and even horse gears are occasionally employed, more especially with fixed machines. The corn is passed by hand or self-feeder into the drum mouth and is threshed out by beaters. The straw is passed out, after the grain has been shaken away, by means of riddles, an air blast from a fan, and rotary screens which grade the corn. The most common of the threshing machine's auxiliaries are the chaff cutter, for cutting oats or barley straw into short lengths for cattle feed; the straw tier, which produces bundles or trusses of straw for thatching, etc.; the straw baler, which compresses the straw into wire-bound bales; and the huller, which is used for threshing very small seeds. The combine harvester cuts and threshes in one operation and has threshing mechanism similar to that of a stationary thresher. However, it is not always possible to produce clean grain, because of the quantities of green weeds cut close to the ground which tend to clog the sieves in the machinery, and thus small pieces become included in the threshed grain; for this reason it may be necessary to pass the grain through a separate dressing machine. Since the grain is cut and threshed at the same time, and has no opportunity to dry naturally in the traves and stack (see **REAPING**), the moisture content may remain high. Unless the grain is then dried artificially in plant installed in the farm buildings for that purpose it may heat or ferment when stored. The straw left by the combine tends to be much broken, but if wanted for litter or fodder it can be collected by a pick-up baler or swept up to a stationary baler or stack. Otherwise it is left to be ploughed in or burnt.

Thrasimene, see **THRASIMENE LAKE**.

Thrasylbulus, son of Lycus, an Athenian. He took an active part in overthrowing the Four Hundred in 411 BC, was banished by the Thirty Tyrants, but returned to expel the Ten and restore the Athenian democracy in 404. In 390 T. commanded the Athenian fleet in the Aegean, and was slain by the inhab. of Aspendus in Pamphylia.

Thread, fine cord made by twisting the fibres of such substances as cotton, wool, silk, and flax. The slightly twisted yarns used for weaving are strictly called T.s, but the term is more commonly applied to

the stronger and more highly finished cords used for sewing, etc. The cotton or other material is first twisted into yarn, which is doubled upon itself and twisted in the opposite direction to the original twist. The product is then 2-ply thread. To make a stronger thread, e.g. 6-cord T., a number of 2-ply yarns are twisted by the winding machine again in the opposite direction to the previous twist.

Thread (of screws), see SCREWS, BOLTS, AND NUTS.

Thread Cells, Stinging Cells, or Cnidoblasts, occur in Coelenterates as cells with bulb-shaped structures (nematocysts) containing fluid and having the narrower end prolonged into a fine tube folded inwards in the cavity of the bulb as a spiral coil. Externally the cell may bear a conical projection (cnidocil), and when a small animal comes in contact with this the fine tube turns inside out and is shot into the animal's body, becoming fixed by barbs at the base of the tube while poison passes through it. They are the stings of the jelly fish and are also well developed in the 'Portuguese Man-of-War' (Physalia) and 'sea wasps' (Cubomedusae). In Australian waters 'sea wasps' cause a number of deaths each year among bathers.

Thread-worms, see NEMATODES.

Threadneedle Street, famous thoroughfare in the city of London, running E. from the Bank of England (sometimes familiarly called the 'Old Lady of T. S.') to Bishopsgate. The name is sometimes considered to derive from a signboard with 3 needles on it, but it is more likely to have been connected with the children's game 'thread the needle,' once commonly played in some tns.

Threats. It is a felony either: (a) verbally to accuse or threaten to accuse another of any infamous crime (e.g. murder, rape) with a view to extorting from the person so accused or threatened or from any other person any property, money, or valuable security; or (b) to send a letter containing T. to accuse another person of crime with intent to extort something of value; and so gravely does the law regard this offence that a conviction may involve a sentence of imprisonment for life. The guilt or innocence of the recipient is material only in considering whether the intention of the prisoner was to extort money by his T. or merely to compound a felony (see COMPOUNDING). Similarly it is a felony punishable with imprisonment for any term up to life to send a letter demanding with T. and without reasonable cause any money or other property. Sending a letter containing T. to murder a person, or to burn or destroy his house, or to maim his cattle, are all felonies punishable with 10 years' imprisonment. See also BLACKMAIL.

Three Choirs Festival, music festival estab. in 1724. It is held annually, in Sept., alternately in the cathedrals of Hereford, Gloucester, and Worcester. New works from eminent contemporary composers have always been a feature of the T. C. F., the works of Parry, Elgar,

and Vaughan Williams having especially been promoted there. Standard oratorios like *Messiah* and *Elijah* are firmly entrenched.

Three-Colour Process, see PROCESS WORK.

Three Kings, Feast of, see EPIPHANY.

Three Mile Limit, see TERRITORIAL WATERS.

Three-phase System, electric a.c. supply system in which 3 lines are at voltage of equal peak value and frequency but differing in phase by $\frac{1}{3}$ cycle: $E \sin \omega t$, $E \sin (\omega t - 120^\circ)$, $E \sin (\omega t - 240^\circ)$ (see ELECTRIC MACHINES; TRANSMISSION). A fourth wire, at earth potential, is usually added in distribution networks. If the voltage between lines is 380 V, the voltage to the fourth wire (neutral) is $380/\sqrt{3} = 220$ V (see STAR/DELTA), the system is indicated as 380/220 V. In a distribution network it is important to keep a 'balanced load,' i.e. the phase circuits should be as near as possible equally loaded. The phases are named red, white, blue, and in connecting a 3-phase motor or transformer into the system, it is essential to observe the correct sequence. This can be tested by connecting 2 equal lamps and a reactor in 'star,' joining the 3 free ends to the 3 supply terminals; one lamp will be brighter than the other, the terminal to which it is connected is marked 'red,' the other lamp terminal 'blue,' the reactor terminal 'white.' The power may be measured by 2 wattmeters, with their current coils in 'red' and 'blue' lines, the volt coils connected to 'white.' The power is the sum of the 2 readings.

Three Rivers. In Quebec, see TRÔIS RIVIÈRES.

Threnody (Gk, *thrēnos*, wailing, and *ōdē*, ode), song of lamentation, especially on a person's death. Gaelic literature supplies examples in the typical 'keens,' as e.g. the 'Keen on Art O'Leary,' originally pub. in Mrs Morgan J. O'Connell's *The Last Colonel of the Irish Brigade*, 1892. The true example of the spontaneous keen is in short, broken lines, containing in quick, natural succession, appeals, reminiscences, laments, and moves backwards and forwards as the irregular promptings of grief and affection dictate without form or premeditation. See also DIRGE; GAELIC LANGUAGE AND LITERATURE.

Thresher, see FOX-SHARK.

Threshing, see THRASHING.

Thrift, or Sea Pink (*Armeria maritima*), summer-flowering perennial plant of the family *Plumbaginaceae*. It has slender, stiff, grass-like leaves growing in bundles from the woody branches of the rootstock. The soft, funnel-shaped, rosy flower heads rise on slender hairy stems from the tufts of leaves. T. grows wild on cliffs and rocks in seaside places, and also in mt dists. *A. plantaginea* is the Jersey Thrift.

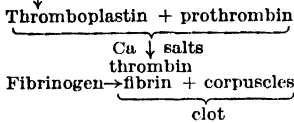
Thring, Edward (1821-87), educationist, b. Somerset and educ. at Eton and King's College, Cambridge. Elected a fellow of that college, T. was, for a time, curate at Gloucester and other places, and

finally headmaster of Uppingham School. A most earnest, enlightened, and successful teacher, he built up an enduring reputation for his school, of which he was headmaster from 1853 till his death. See life by G. R. Parkin (2 vols.), 1898; and G. Hoyland, *The Man Who Made a School*, 1946.

Throat, the front of the neck; or the upper part of the respiratory passages in the neck. See PHARYNX; LARYNX; TONSILS; etc.

Thrombin, enzyme (organic catalyst), which brings about the clotting of blood by catalysing (speeding up) the conversion of *fibrinogen*, present in the blood plasma, into *fibrin*. The latter substance, as its name implies, is deposited as a fibrous network in which the corpuscles of the blood become entangled, the whole mass constituting the clot, whereby further loss of blood is prevented. Since blood does not normally clot whilst still circulating in the vessels, it is thought that T. is not present as such but in the form of its precursor, *prothrombin*. The damaged tissues and blood platelets (See under BLOOD) at the site of a wound liberate *thromboplastin*, which, under the influence of calcium salts, combines with *prothrombin* to form T.

Damaged tissues
and platelets



The blood-sucking leeches are able to produce *hirudin*, which combines with *prothrombin* and hence prevents clotting. The clotting mechanism is disturbed in the conditions of (1) *thrombosis*, when it takes place in the vessels, and (2) *haemophilia* (q.v.), an inherited disease in which the blood continues to escape for a long period even from a small wound. A mucopolysaccharide known as *heparin*, which occurs in many tissues, but most abundantly in the liver, when injected into the blood stream prevents coagulation by stopping the conversion of prothrombin into thrombin. It is used therapeutically in cases of thrombosis, particularly coronary thrombosis (see HEART). See also under ENZYMES.

Thrombosis and Embolism formation of a plug by the coagulation of blood or by depositions from it, and results from injury to the endothelial cells lining the walls of the vascular system. The clots are deposited on the injured wall, and serve as nuclei for further depositions. They obstruct the circulation, and may even completely close the lumen of the blood-vessel. Since blood flows more slowly through the veins, venous thrombosis is more common than arterial thrombosis. The extent of the injury caused by thrombosis depends on the size, situation, and condition of the thrombus. In a main

vessel the blockage may be fatal; in smaller vessels it usually results in the necrosis of the surrounding tissues. Septic thrombi cause local abscesses, and may give rise to pyaemia. Frequently by the movement of the blood or by disturbing body movements the thrombus, or pieces of it, become detached, forming emboli and the carriage of these in the bloodstream is termed embolism. Embolism may also be due to the occlusion of air, usually resulting from the exposure of a wound. Emboli of fat may be formed by the escape of fat from bone marrow when bone is badly fractured. Emboli may block the circulation at a point far removed from the situation of the thrombus, and, when septic, cause abscesses and empyema. An embolus blocking the pulmonary artery will cause sudden death, but in arteries with numerous branches comparatively little interference with circulation is caused by the obstruction of one branch. Obstruction of vessels at some distance from the heart may result in gangrene (q.v.).

Thrush (*Turdidae*), family of passerine birds of very extensive distribution and of omnivorous diet. The typical genus *Turdus* includes sev. Brit. species, such as the blackbird, the ring ousel, redwing, and fieldfare, to which the name T. is not commonly applied. The song T. (q.v.), thrush, or mavis, is one of the best-known Brit. song-birds. The missel T. or holm T. (*T. viscivorus*) is a larger bird with a slightly forked tail. It sings before and during storms.

Thrush, species of inflammation of the mouth due to a particular fungus known as *Oidium albicans* or *Saccharomyces albicans*, and characterised by diffuse white patches. It generally occurs in feeble children, but adults, prostrated by wasting diseases, may also be affected by it. It is also a disease which affects the frog of a horse's foot.

Thucydides (c. 464-c. 402 BC), Gk historian, the son of Olorus, or Orolus, and Hegesipyle, was a native of Attica. He is said to have been instructed in oratory by Antiphon, and in philosophy by Anaxagoras. He possessed gold mines in that part of Thrace which is opposite to the is. of Thasos, and here he was a person of the greatest influence. He commanded an Athenian squadron of 7 ships at Thasos (424), but failing in his attempt to save Amphipolis, he became an exile, probably to avoid a worse punishment. He spent 20 years in exile (v. 26), returning in 404 BC, when a general amnesty was granted on the restoration of the democracy by Thrasybulus. According to some accounts, he was assassinated at Athens or possibly in Thrace; according to others, he d. at Thasos, and his bones were carried to Athens. At all events, his death cannot be placed later than 401.

The Peloponnesian war forms the subject of the hist. of T. Though he was engaged in collecting materials during the whole of the war, he does not appear to have reduced them into the form of a hist. until after his return from exile, since he alludes in many parts of it to the con-

clusion of the war (l. 13; v. 26). He did not, however, live to complete it: the eighth book ends abruptly in the middle of the year 411 BC, 7 years before the termination of the war. The object of the hist. was to give such a faithful representation of the past as would serve as a guide for the future (l. 22). His observation of human character was profound, and his painstaking accuracy and careful attention to chronology are remarkable. His strict impartiality is another feature of his work. His style is marked by great strength and energy, but he is often obscure, particularly in the speeches. The Oxford text, *Thucydides Historia* (2nd ed.) ed. by H. Stuart Jones and J. Powell, was pub. in 1942. See also C. F. Smith, *Thucydides* (2 vols. with trans.), 1945; A. W. Gomme, *A Historical Commentary on Thucydides*, 1945; G. B. Grundy, *Thucydides and the History of his Age* (2nd ed., 2 vols.), 1948; I. Grene, *Man in his Pride: a Study in the Political Philosophy of Plato and Thucydides*, 1950.

Thucydides, Athenian statesman who led the aristocratic party in opposition to Pericles (q.v.). He was ostracised in 443 BC.

Thugs, roving bands of fanatical murderers and robbers who used to infest parts of Central and N. India. Thuggery, as their system was called, had a religious basis, the murdered persons and a certain part of their belongings being regarded by the T. as sacrifices to the goddess Kali. The systematic suppression of the T. was begun about 1830 by Capt. W. H. Sleeman, Bengal Army (afterwards Maj.-Gen. Sir William Sleeman), and continued for many years afterwards; indeed, the dept for the suppression of Thagi and Dakaiti came to an end only in the present cent.

Thuja, family Pinaceae, a genus of conifers, pyramidal in habit, with scale-like leaves on flattened branchlets. *T. occidentalis* is Amer. Arbor-vitae; *T. orientalis*, Chinese Arbor-vitae; and *T. plicata*, W. Arbor-vitae; all very variable and hardy for Brit. gardens.

Thule: 1. Name given by the ancients to the most N. part of Europe known to them. Pliney said it was an is. in the N. ocean, discovered by the navigator Pytheas of Massilia, 6 days' sail from the Orades. Müllenhoff plausibly identifies it with the Shetlands. Procopius and others use it for Scandinavia. T. appears to be a Gk form of the Gothic *Tiel* or *Tiule*, 'remotest land.' The phrase '*ultima Thule*' denotes any far-away unknown region.

2. A settlement in N. Greenland (Danish). The original Thule was at lat. 76° 34' N., long. 68° 49' W., where a U.S. air base was built during the Second World War. This led the Eskimos to move to a second Thule (lat. 77° 27' N., long. 69° 11' W.), in 1953. Official new place-names have been given to each, but confusion is avoided by reference to Thule air base and Thule village. See also RASMUSSEN. See K. Rasmussen, *Greenland by the Polar Sea* (trans.), 1921; A.

Gilberg, *Eskimo Doctor* (trans.), 1948; *Polar Record*, vol. 8, No. 58, 1956, pp. 176-7.

Thulium, metallic chemical element, symbol Tm, atomic weight 169.4, atomic number 69, belonging to the rare-earth group (q.v.). It was discovered in 1879 by Cleve, but was first prepared pure by James in 1911. Its salts are pale green in colour. T. is extracted from the minerals gadolinite, euxenite, etc.

Thulla, see ADULIS.

Thumbscrew, iron instrument of torture for compressing or breaking the thumbs. It was used by the Sp. Inquisition and in the persecutions of the Covenanters in Scotland, where its last recorded use was towards the end of the 17th cent.

Thun: 1. Lake in the canton of Bern, Switzerland, traversed by the R. Aar. Length 11 m.; average width, 2 m.; greatest depth, 700 ft; altitude 1840 ft.

2. Tn in the canton of Bern, on the R. Aar, 1 m. below its exit from the above lake. It is a trade centre, and has slate and brick works. Pop. (1955) 25,900, Ger.-speaking Protestants.

Thunder, see THUNDERSTORM.

Thunderbolt, or **Thunderstone**, common name for objects once erroneously thought to have been formed by thunder and lightning, the belief being that thunder somehow sent forth a destructive bolt or dart (cf. Zeus's levin bolts in Greek mythology). A so-called T. is really a discharge of lightning from one part of the sky to another, and especially one to earth which does damage. Lightning in certain cases does leave behind it a vitrified tube, called a fulgurite (see FULGURITES), which, however, is not flung or darted, but is created by vitrification or fusing on the spot where it is found. The term thunderstone is used especially for objects having more or less a dart or arrow shape, for belemnites, for meteorites (q.v.), and the pyrites nodules to be found in cretaceous rocks. The T. myth recurs in many lands; but the Sioux 'among their varied fancies about thunder-birds (an imaginary bird in the mythology of races of low culture, and personifying thunder) and the like, give unusually well a key to the myth. They consider the lightning entering the ground to scatter there in all directions *thunder-bolt stones*, which are flints, etc., their reason for this notion being the very natural one, that these siliceous stones actually produce a flash when struck' (Tylor, *Primitive Culture*). In the traditions of the Finns concerning purification by fire, it became expedient to find a substitute, and hence the healing virtues of the T. were embodied in the *Keravania* or thunderstones. The 'holy stones' of the A.-S., or 'holed stones', arrow heads, flint knives and the like worked by prehistoric men, were popularly believed to be stones which, falling down from heaven, possessed heavenly virtues, and were of use in all sorts of diseases.

Thunderer, *The*, see 'TIMES, THE.'

Thunderstorm, rain, snow, or hailstorm with thunder and lightning. Lightning is an electrical discharge which causes

rapid expansion and contraction of the air, producing the sound of thunder. The light from a stroke travels at 186,000 m. per sec., but thunder only at 1100 ft per sec., so that, although both occur simultaneously, thunder is heard some time later, 5 sec. for every mile away. Since different parts of the lightning flash are at different distances and heights, and the speed of sound decreases with height, the thunder is not normally heard as a single crack but as a succession of rolling sounds. As a rule thunder can be heard only at distances up to 10 m., but this varies with the conditions, and thunder has on occasion been heard up to 300 sec. after the lightning flash—from 60 m. away.

Observations in America by a close network of ground stations and specially equipped fighter aircraft have shown that a T. consists of several convective cells each up to 5 m. in diameter starting with an up current extending up to more than 20,000 ft often attaining more than 60 m.p.h. As this air rises its temp. soon falls to the dew point and below, and water droplets are condensed out, forming cloud and eventually raindrops in great quantities. The maximum raindrop size is 5.5 mm. diameter, with a maximum falling velocity through the air of 18 m.p.h.; after any further growth the raindrops are deformed and broken (*see RAIN AND RAINFALL*); so that they are carried up into the top parts of the cloud. From there and even lower levels if the up current is slanting, the rain can fall into surrounding, initially drier, air into which it begins to evaporate. This air then becomes colder and heavier than its surroundings and generates a down current which appears at the surface as a cold gust or squall. Although much of the rain is evaporated in maintaining saturation of the down current, most reaches the surface, and the heaviest rainfall is observed in this region of cold air. When the down current reaches the surface it must spread out and can extend as much as 12 m. in advance of the T. It acts as a cold wedge, and may give the initial upthrust to start new convection cells of the T. Eventually the up current in the older convection cell fades from the base upwards, and the whole cell then consists of a down current before dying away completely.

A thundercloud is essentially a gigantic electrical generator which works, like all generators, by separating positive and negative charges. It is now generally agreed that the vast majority of thunderclouds have a preponderance of positive charge at the top and of negative charge at the base, but the mechanism by which this distribution is brought about is still a matter of debate. It is clear, however, that the violent up-and-down air currents within the cloud supply the energy necessary to effect the separation of charge. There are 3 main contending theories, those of Frenkel, Simpson, and C. T. R. Wilson. Frenkel's explanation depends on the fact that a drop of water formed by condensation becomes negatively charged by attracting to itself negative

ions (q.v.) from the surrounding air, which is then left with an excess of positive ions. Simpson's theory is that ice particles become negatively charged by friction with their neighbours, leaving the surrounding air with an excess of positive charge. The heavier ice particles fall and melt, thus giving the required excess of negatively charged drops at the base of the cloud. Wilson's theory, which now commands most support, begins by supposing that an initial charge separation has been achieved either by the Frenkel or the Simpson process (or by both acting simultaneously) and that afterwards the drops acquire induced negative charges on their upper surfaces and positive charges on their lower surfaces. Because of this, a falling drop sweeps up a preponderance of negative ions and a rising drop an excess of positive ions, thus producing the observed field within the cloud.

Lightning. A lightning stroke is a huge electric spark, produced by the enormous potential difference, as much as 100,000,000 or 1,000,000,000 volts, between different parts of the cloud or between different parts of the cloud and the ground. **Forked Lightning** begins with a faintly luminous 'leader' stroke, which branches and darts from side to side in an effort to find the easiest path, and is quickly followed by the intensely bright 'return' stroke. The return stroke carries most of the huge current, often as high as 20,000 amps. What appears to the eye as a single flash is usually made up of a number of strokes in quick succession, giving the characteristic flicker. Because of the very brief duration of the stroke, the amount of electricity involved is usually small, about 20 coulombs, and the length of a flash varies between $\frac{1}{4}$ and 3 m. **Sheet Lightning** is the diffuse illumination from a flash within a cloud or the reflection of a distant flash. **St Elmo's Fire** (q.v.) is a luminous glow seen at night at the top of a ship's mast or on aircraft in thundery weather. The existence of **Ball Lightning** is a matter of debate. There are many circumstantial accounts of the appearance of moving balls of fire during thunderstorms, but most meteorologists now attribute these to optical illusions or to St Elmo's Fire.

Lightning tends to strike tall objects, such as steeples, chimneys, masts of ships, and trees. There is no truth in the popular belief that L. never strikes twice in the same place, and the Empire State Building in New York has been struck over a thousand times. Protection against Lightning damage is best afforded by the **lightning conductor**, a copper rod extending vertically above the highest point of a building and earthed by a thick copper strip kept well away from the outer face of the walls. The rod works by providing a path of low resistance for the electrical current in the stroke and not, as often stated, by neutralising the electric field in the vicinity of the building. The lightning conductor was invented by Benjamin Franklin and first used by him in 1752.

See also **ELECTRICITY, ATMOSPHERIC.** See W. J. Humphreys, *Physics of the Air*, 1920; B. F. J. Schonland, *Atmospheric Electricity*, 1932, and *The Flight of Thunderbolts*, 1950.

Thurber, James Grover (1894-), Amer. humorist, b. Columbus, Ohio. Educ. at Ohio Univ., he worked as journalist and artist, and in 1926 became a leading member of the staff of the *New Yorker*. In his first book, *Is Sex Necessary?*, 1929, he collaborated with E. B. White. His other works, illustrated with his own drawings, include *The Owl in the Attic*, 1931, *The Seal in the Bedroom*, 1932, *The Middle-Aged Man on the Flying Trapeze*, 1935, *Let Your Mind Alone*, 1937, *The Last Flower*, 1939, *Fables for Our Times*, 1940, *Men, Women, and Dogs*, 1943, *The Great Quillow*, 1944, *The Beast in Me and Other Animals*, 1948, *The Thirteen Clocks*, 1950, *The Thurber Album*, 1952, and *The Thurber Country*, 1953. *My Life and Hard Times*, 1933, is autobiographical. His work has been described as a mixture of absurdity, inconsequence, and irony.

Thurgau (Fr. *Turgovie*), canton of N.E. Switzerland, having Lake Constance and the Rhine to the N. and NE. Area 386 sq. m. It is watered by the Thur, Sitter, and Murg. The canton is a prosperous agricultural area. Embroidery, spinning, and weaving are the chief industries. Cap. Frauenfeld (q.v.). Pop. (1955) 155,800, Ger.-speaking, mainly Protestants.

Thurifer (Lat. *thus*, incense; *fero*, I bear), the server who bears the incense in Christian worship.

Thurii, more rarely **Thurium** (*Terra Nuova*), Gk city in Lucania, founded in 443 BC near the site of the ant. Sybaris. It was built by the remains of the pop. of Sybaris, assisted by colonists from all parts of Greece. Among these colonists were the historian Herodotus and the orator Lysias. The new city rapidly became one of the most important Gk tns in the S. of Italy.

Thüringen, see **THURINGIA.**

Thüringerwald, see **THURINGIAN FOREST.**

Thuringia (Ger. *Thüringen*), name given to a region of central Germany which lay between Prussia, Hesse-Nassau, Saxony, and Prussia (qq.v.). The region comprised mainly the duchies and principalities which derived from the country allotted to the Ernestine branch of the Wettin (q.v.) family at the division of the possessions of the house in 1485. The chief states referred to as T. were Saxe-Weimar, Saxe-Coburg-Gotha, Saxe-Meiningen, Saxe-Altenburg, Schwarzburg-Rudolstadt, Schwarzburg-Sondershausen, and the 2 Reuss principalities (qq.v.). In 1919 the Reuss principalities were merged into one People's State of Reuss, and Coburg elected to merge with Bavaria (q.v.). In the same year the 7 Thuringian states were amalgamated to form the prov. of T. In 1945 T. became a *Land* of E. Germany, but in 1952 it was divided into the *Bezirke* of Erfurt, Gera, and Suhl (qq.v.). The chief tn of T. was Weimar (q.v.). Area 6023 sq. m.

Thuringian Forest (Ger. *Thüringerwald*), range of wooded hills in central Germany, extending for about 80 m. SE.-NW. from the R. Werra near Eisenach (q.v.) to the (Thuringian) Saale (q.v.). It is known for its beauty. The highest point is the Grosse Beerberg (3218 ft), in the NW.

Thurles, mrkt tn of co. Tipperary, Rep. of Ireland, on the R. Suir. It is on the main Dublin-Cork road and rail routes. The Catholic Cathedral (1857) was built on the site of the Carmelite foundation (1300). St Patrick's Diocesan College was estab. in 1837. There are turf-bogs and coal mines near by, and T. has sugar-beet and mineral-water factories. Pop. 6300.

Thurlow, John (1616-68), politician, son of an Essex clergyman. He was appointed secretary to the Council of State in 1652, in which capacity he revealed remarkable adroitness in unmasking the intrigues of the enemies of the administration. He sat in Parliament (1654-6), and in Cromwell's second council (1657), and was appointed governor of the Charterhouse (1657), and chancellor of Glasgow Univ. (1658). He subsequently wrote sev. papers on foreign affairs for the information of Clarendon. The *Thurlow Papers* are one of the major original sources for the hist. of the Protectorate.

Thurlow, Edward, first Baron (1732-1806), lawyer, b. Bracon-Ash, Norfolk, son of a clergyman. Educ. at Canterbury Grammar School and at Caius College, Cambridge, he was sent down for insubordination in 1751, without a degree. Called to the Bar, 1754, he distinguished himself at an early age in his legal career, taking silk in 1762. In 1768 he was returned to Parliament for Tavistock in the Tory interest, and his speech in the same year in the Douglas Peerage case greatly enhanced his reputation. As a zealous supporter of Lord North he became solicitor-general in 1770 and attorney-general the following year, supporting the gov.'s stand against the rights of juries in cases of libel and the liberty of the press. He won over George III by upholding his Amer. policy and sharing the king's hostility towards the N. Amer. colonies. In 1778 he became Lord Chancellor and Baron Thurlow, and while retaining office under the Rockingham Gov., he opposed all its measures in a spirit of violent factiousness. He was always in opposition to the king, who was virtually his own Prime Minister and foreign minister. Under Fox and North, however, he was forced to resign, but returned to the Woolsack under Pitt, when he once more began to undermine the influence of his colleagues. Eventually, when he openly attacked Pitt's National Debt Redemption Scheme, Pitt intimated to the king that either he or T. must go, and the king at length agreed to T.'s removal (1792). T. was a master of mordant wit, profane, vulgar, overbearing, and immoral, but 'no man,' said Fox, 'was so wise as Thurlow looked,' a gibe excited by T.'s physical appearance—harsh dignified features, piercing eyes under shaggy

eyebrows. He was the patron of Dr Johnson and of George Crabbe, and it is said that he was the first to discern the legal talent of Eldon. See J. C. Campbell, *Lives of the Chancellors*, 1845-69; E. Foss, *Judges of England*, 1848-64.

Thurmayr, Johann, see AVENTINUS.

Thurn and Taxis, Princes of, succession of princes who ruled over an immense stretch of land in Central Europe. The most famous of them, Count Matthias, commanded the Bohemian forces at the time of the dispute over the Bohemian succession, and later served Denmark and Sweden. The Princes of Thurn and Taxis claimed a hereditary right over the administration of postal affairs in Central Europe, having estab. posts as early as 1460. The last vestige of these rights disappeared in 1866 with their purchase by the N. Ger. Federation. See J. B. Mehler, *Das fürstliche Haus Thurn und Taxis*, 1899.

Thurnscoe, see DEARNE.

Thurrock, urban dist. of Essex, England, created in 1936 by the amalgamation of the former urban dists. of Grays, Thurrock, Tilbury, and Purfleet, and the rural dist. of Orsett, is one of the largest urban dists. in England. Industries include the manuf. of cement, soaps, detergents, and margarine, and oil refining. At Tilbury are extensive docks and ship-repairing workshops, and close by is Tilbury Fort, estab. by King Henry VIII. A portion of Rom. tessellated pavement and other antiquities have been found at Grays. In Hangman's Wood, Little Thurrock, are a celebrated group of dene holes. A passenger and car ferry connects Tilbury with Gravesend on the S. bank of the Thames. Pop. of urban dist. 91,140.

Thursday, fifth day of the week. It is named after Thor, the Scandinavian god of thunder. In the Rom. calendar the fifth day was Jupiter's Day, *dies Jovis*.

Thursday Island lies 30 m. off the N. tip of Cape York Peninsula, Queensland, Australia; it is H.Q. for the Torres Straits pearling industry. Area $1\frac{1}{2}$ sq. m.; pop. 2066.

Thursley (from Thor's lea), village of Surrey, England, near Hindhead. It has a picturesque common and an old par. church which is partly Saxon. Iron was formerly worked in the vicinity. Pop. 700.

Thurso, seaport and mrkt tn of Caithness, Scotland, on Thurso Bay. It was formerly a trading centre with Scandinavia, and now exports Caithness flagstones. Harold's tower, over the grave of Earl Harold, once owner of Caithness and the Orkneys and Shetlands, is near T. Castle, home of a branch of the Sinclairs. T. was once the centre of Norse power on the mainland when at its zenith in the early 11th cent. and afterwards until the battle of Largs. The main industry is fishing, and it is also a holiday resort. Pop. 3200.

Thylacine, or Tasmanian Wolf (*Thylacinus cynocephalus*), a carnivorous marsupial of Tasmania, somewhat resembling a wolf. The fur, however, is

close and short, and the tail long and tapering; its fur is grey-brown and striped with black. The 4 young are carried in the pouch until they outgrow it.

Thyme, or Thymus, genus of small prostrate aromatic plants (family Labiatae), with rose-coloured, white, or heliotrope flowers. The 2 Brit. species are *T. pulegioides* (synonym *chamaedrys*) and the mt *T. (T.) serpyllum*, of which the lemon-scented *T.* of gardens is a variety. The *T.* used for seasoning and flavouring is *T. vulgaris*, a native of S. Europe.

Thymus Gland, temporary organ lodged partly in the anterior superior mediastinum, partly in the neck. It attains its full development at about the end of the second year of life, remains unaffected until puberty, after which it gradually atrophies and disappears. Its function is uncertain. A persistent *T. G.* in the adult has been considered (probably incorrectly) to be responsible for the condition of *status lymphaticus*, when death may follow any sudden exertion or shock. Recently the *T. G.* has been removed in the treatment of *myasthenia gravis*.

Thyratron, grid-controlled, hot-cathode valve with a trace of gas or mercury vapour, used as electronic switch or relay for timing current pulses. If a *T.* is connected across a capacitor being charged from a const.-voltage supply through a resistance, and the grid is kept negative, no current flows in the *T.* until the capacitor voltage reaches a value at which the anode potential is sufficient to make the electrons 'break through' the negative grid. The capacitor then discharges suddenly through the *T.* until the anode potential sinks below the critical value, whereupon the capacitor begins to charge again. The process is repeated automatically. The rate of charging depends on the time constant (q.v.) of the capacitor + resistance; the critical anode potential depends on the grid potential. Both can be adjusted so as to make the process repeat with a period between a few secs. and 0.0001 sec.

Thyroid Gland (Gk *thyreos* shield; *eidos* form), one of the ductless glands consisting of 2 lateral lobes, conical in shape, connected at about their lower thirds by an isthmus which passes transversely across the trachea. A third lobe called the pyramid sometimes arises from the upper part of the isthmus or from one of the lobes, generally on the left side, and ascends to the level of the hyoid bone. Occasionally this lobe is found to be detached. Structurally, it consists of follicles lined with epithelium, producing a peculiar yellowish, glue-like substance known as colloid. Its function is the production of the hormone thyroxine, which increases the rate of metabolism. In amphibia thyroxine causes metamorphosis, e.g. of the tadpole into the frog. Enlargement of the *T. G.*, which may be due to hypertrophy of any of its constituent parts, is known as goitre (q.v.). When the hypertrophy is associated with increased secretory activity in the gland a toxic state results, known as thyrotoxicosis (q.v.), from an excess of thyroxine

in the blood. Of the symptoms of thyrotoxicosis the most noticeable is a protrusion of the eyes, and for this reason a toxic goitre is referred to as an exophthalmic goitre (q.v.). Deficiency of secretion in the T. G. causes a condition known as cretinism (q.v.), when the failure of function is congenital, and myxoedema (q.v.) when the gland fails in function in later life. Measurement of the basal metabolic rate (B.M.R.) is a long-established method of testing thyroid function. Essentially the test consists in recording the patient's oxygen consumption over a period of about 10 min. while the patient is at rest. By means of tables the amount of oxygen consumed is converted to its equivalent in heat production per unit of surface area (calories per sq. metre per hr) and then, by reference to further tables of age and sex, this is converted into a percentage of normal. The normal range of the B.M.R. is about ± 10 per cent. The usefulness of this test depends on ensuring that the patient really is fully resting when it is made, for the 'basal' state means as nearly as possible complete muscular, mental, and digestive rest. With a nervous patient, and those with thyrotoxicosis are nervous, this is difficult to achieve. A more modern test consists in assessing thyroid activity by measuring the speed of iodine metabolism by means of radioactive iodine. A 'tracer' dose of radioactive iodine is given to the patient, and by detecting, by means of special apparatus, its speed of movement throughout the body, and thus the speed of movement of iodine atoms in the body generally, the speed of iodine metabolism, which, in turn, depends on thyroid-gland function, may be measured. This is a reliable test, but its application is somewhat limited by the need for special apparatus. Also it cannot be used if the patient has had recent iodine medication of any kind. The function of the T. G. is largely controlled by the thyroid-stimulating hormone (T.S.H.) secreted by the anterior pituitary gland (q.v.). See also under HORMONES; DUCTLESS GLANDS.

Thyrotoxicosis, see HYPERTHYROIDISM.

Thyrsus, wand carried by Dionysus and the Bacchants in his orgiastic rites.

Thysanura, or **Bristle Tails**, order of wingless insects, with long, many-jointed feelers and small paired limbs on several of the abdominal segments. They occur under stones or in damp earth, and often in human dwellings, one especially favouring bakers' ovens. One of the best known is the 'silver fish' (*Leptisma saccharina*) often found among papers in drawers and cupboards.

Thyssen, Fritz (1873–1951), Ger. industrialist, b. Mühlheim, Ruhr, son of August T. (1842–1926), one of the founders of the Ger. steel industry. His father left him a 26 per cent interest in the vast Vereinigte Stahlwerke, or Ger. steel cartel, and he became its chairman of directors after 1926, with control of great iron and steel manufacturing plants. He had always been a nationalist and during the Fr. occupation of the Ruhr in 1923 he was court-martialled and imprisoned. He was

among the first Ger. industrialists to aid Hitler's rise to power, and after Hitler became chancellor T. was rewarded by the reorganisation of his virtually bankrupt company at the expense of the Reich, becoming, in effect, economic dictator of the Ruhr industrial region. From 1936, however, he began to disagree with Hitler's policies, and at the outbreak of war in Sept. 1939 he fled abroad. After the War a denazification tribunal deprived him of part of his property. T. d. in Buenos Aires. He wrote *I Paid Hitler*, 1941.

Tian Shan, see TIENSHAN.

Tiara: 1. Papal triple crown, symbol of sovereign power, not sacred like the mitre, a high cap of gold cloth, encircled by 3 coronets and surmounted by a gold cross.

2. Jewelled head ornament, usually of precious metal and diamonds, worn on the forehead of the head. It often begins in a foliage or scroll design at the sides of the head, rising to a higher central group. Diadem is an older word for the T. Diadems consisting of flat bands of gold links were found in the ruins of Troy and elaborate gold head-dresses of great magnificence, dating from 3500 BC, were found in the tombs of the Chaldean kings. The modern gem-set T. dates from a Napoleonic court fashion. It is worn on full-dress occasions.

Tiber (It. Tevere; Lat. Tiberis), third largest riv. of Italy, rising in the Apennines (q.v.) on the E. borders of Tuscany (q.v.), and flowing generally S. past Perugia (q.v.) and Rome (q.v.) to the Tyrrhenian Sea near Lido di Roma (see OSTIA). It is joined near Narci (q.v.) by the Nera, its most important trib.; other tribs. are the Aniene (q.v.), the Chiascio, and Paglia. The T. empties into the sea by 2 arms: the S. arm, or *Fiumara*, is silted up; the other, the *Fiumicino*, is canalised. The morass between the arms was once known as the Sacred Is. or the Is. of Venus. Ships of small tonnage ascend the riv. to Rome. Length 245 m.

Tiberiacum, see BAGNACAVALLI.

Tiberias, tn in Israel. The anc. city lay on the W. shore of the Sea of Galilee. Herod Antipas founded a new city c. AD 26, and called it T. in honour of the Emperor Tiberius, his benefactor. It later became the cap. of Galilee, a position held previously by Seppholis. It continued to be the seat of gov. under Agrippa I and under the Rom. procurators. After the destruction of Jerusalem (AD 70) it became a resort of the Jews. T. was the seat of a bishop under Constantine. It was taken by the Arabs in 637. Later, it was taken by Tancred, who erected a church in the city, but lost by the Crusaders in 1187. The modern tn stands at the N.E. corner of the plain, some of the front walls actually rising out of the water. T., like tns in Syria and Trans-Jordan, is built of black basalt, which gives it a sombre aspect. It is partly surrounded by walls and bastions, restored by Omar al-Daher. A new residential quarter has grown up outside the walls on the slopes to the NW. of the

old tn. To the S. of the tn are the hot baths, famous for their curative properties in the Rom. occupation. The springs were known to the Romans as Ammaus, and extolled by Pliny. Herod Antipas built baths around the springs and placed his acropolis on the slope above. At present the main source of the springs is covered with a low dome, whence the hot water passes to the baths. The present baths were built by Ibrahim Pasha in 1833, during the Egyptian occupation, and additions were made in 1890 by the Turks. The therapeutic properties of the baths for rheumatism and skin diseases have long been recognised. The saline constituents of the water are chiefly sodium and calcium chloride and magnesium bromide, and the water is slightly radioactive. Below the baths is the tomb of the famous Talmudist Rabbi Meir, and to the N. of the tn those of Maimonides and Rabbi Ben Akiba. At the N. end of Lake T. is Capernaum (Tel Hum), the synagogue of which has been excavated and re-erected. Pop. 17,000.

Tiberine Republic, see ITALY, History.

Tiberiopolis, see VARNA.

Tiberius Claudius Nero (42 BC-AD 37), Rom. Emperor, the stepson of Augustus. He was the son of Ti. Claudius Nero and Livia, afterwards the wife of Augustus. He was carefully educated and became well acquainted with Gk and Lat. literature. At the age of 22 he was sent by Augustus to restore Tigranes to the throne of Armenia, and in 13 BC was consul with P. Quintilius Varus. Three years before this T. and Drusus had been entrusted with the defence of the N. frontiers, and during the years from 12 to 9 BC he had conquered Pannonia. He remained in Germany until 6 BC, in which year he obtained the *tribunitia potestas* for 5 years, and retired with the emperor's permission to Rhodes. He returned to Rome at the end of 7 years, and in AD 4 was adopted by Augustus. In the same year he took command of the Rom. armies in N. Germany and here he remained during the next 7 years. On the death of Augustus, Tiberius hurried home, and the skilful management of Livia secured the throne to him without opposition. T. was suspicious in character, and he began his reign by putting to death Postumus Agrippa, the surviving grandson of Augustus. Then he proceeded to make himself absolute. Tacitus admits that from AD 14 to 23 Tiberius governed with justice and moderation (*Annals*, Books I-III), but ascribes his departure from Rome to a desire to give full vent to his sensual inclinations in private. T. had long hated Rome, and in AD 26 he left it, never to return. He first went to Campania on the pretext of dedicating temples there, but in the next year he moved to Capri, an is. off the Campanian coast. Meanwhile his minister Sejanus, in whose hands the real gov. of the state had long rested, was plotting to obtain for himself the imperial power. In AD 31 he was put to an ignominious death, to which many of his friends followed him. On 16 Mar. T. d. at the villa of

Lucullus at Misenum, having been smothered by the order of Macro, the prefect of the Praetorians. The character of Tiberius has been one of the most disputed points in hist. Tacitus and Suetonius unite in painting it in the blackest colours. He is defended by Dean Merivale in *History of the Romans under the Empire*, 1850-82, and by many subsequent writers. See F. B. March, *The Reign of Tiberius*, 1931; R. S. Rogers, *Studies in the Reign of Tiberius*, 1943.

Tibet, or Thibet, Tubet, or Bod-pa, Autonomous Region of the People's Rep. of China, formerly a dependency of China. It is bounded by the K'un-lun Mts on the N., separating it from the Chinese Sinkiang Autonomous Region; by the Chinghai and Szechwan provs. on the E.; by the Himalaya on the S., separating it from India, Bhutan, Nepal, etc.; and by Kashmir on the W. The boundaries are, in some cases, ill defined, as e.g. in Bhutan, where the bamboo forests appear to be accepted as the limit between the Tibetan rule as, too, was Darjeeling.

T. may be divided into 4 major physical regions: (a) the N. Plains (Chang Tang), a tangled mass of plains and valleys, averaging over 16,000 ft and rising sev. thousand ft higher in its mt peaks and ridges, the most important of which are the Nien-chen-tang-la and the Hlungpo-Gangri ranges. This region is bounded on the N. by Kunlun and the steppes of Tsaidam, and extends S. to the valley of the Tsangpo; (b) S. T. consists of the valleys of the Upper Indus and Sutlej in the W. and the great valley of the Tsangpo in the S. and E. The 3 great rivs. all have their source in the same region, near the sacred lake of Manasarowar; (c) E. T. comprises the mts and valleys lying between the Chang Tang and the Chinese frontier. On the E. slopes of the Chang Tang rise the great rivs. of SE. Asia, the Salween, Mekong, and Yangtse; somewhat to the N. the Hwang Ho; and (d) the great Tsaidam basin with the Tsaidam swamp and the Koko Nor basin to the NE. The N. Plains are treeless owing to the great elevation; vegetation is scanty grass, but sufficient to graze large numbers of yaks, asses, goats, sheep, and other animals. Few potatoes can be grown, so that food for herdsmen has to be brought from other parts of the country. Hence most of this great region is uninhabited and forms one of the main barriers of Central Asia. S. T. is T. proper, known to the Tibetans as Pö (in contrast to the Chang Tang of the N.) and here are found the chief tns, Lhasa, Shigatse, and Gyantse; it also includes the seat of the Dalai Lama and his gov. E. T. is a land of considerable natural resources; grazing is abundant, agriculture is possible on a large scale, and mineral wealth is known to be considerable.

Gold is found in T., and according to some explorers there are rich deposits in N. and E. T. which have been scarcely touched. Mining is carried on in only a few places, and though some gold is exported to China, it amounts to little.

Iron pyrites are found and lapis-lazuli and mercury in small quantities, also salt and borax among the lakes of the N. The climate varies considerably, though for the most part cold and dry. It is influenced by the SW. monsoon, and high winds are frequent. In certain dists, the rainfall is very high and in parts extremes of cold and heat are felt. Sheep and cattle are reared, also goats, pigs, and poultry; and horses, mules, and donkeys are used. There are innumerable species of wild animals, including the yak, leopard, deer, antelope, bear, wolf, etc., and rare kinds of pheasants and partridges are also found.

Trade is carried on principally with Szechwan, Sinkiang, Chinghai, Inner Mongolia, Nepal, India, and Indo-China. The Tibetans are keen traders, and the country is well supplied with trade routes. There is the Srinagar-Leh-Shigatse route, which is joined at Leh by the 'Hindustan-

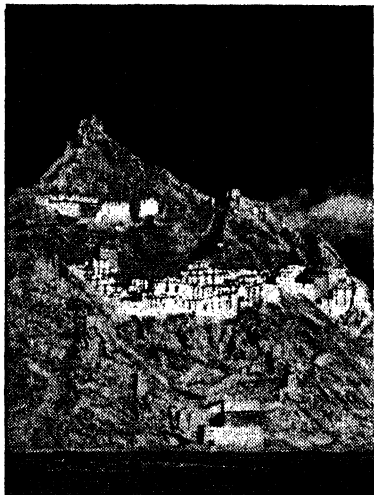
for Chinese tea, which the Tibetans prefer to Indian. Motor cars and lorries are rapidly replacing the erstwhile caravans, and the price of industrial goods from other parts of China has been greatly reduced. An air service between Lhasa and Peking and Lhasa and India was inaugurated in 1956, and both the Dalai Lama and the Panchan Lama visited India in that year by flying over the Himalaya.

The chief imports are silk, carpets, gold lace, tea, porcelain, leather, cotton goods, horses, and sheep, and the chief exports are wool and woollen goods, salt, rugs, furs, drugs, borax, and some gold and silver.

The people of T. are of Mongoloid origin, as far as is known, and they speak Tibetan, which is allied to Burmese, and comprises a number of dialects. The religion of the country is Lamaism (q.v.). Polyandry is a custom of the people, all the brothers in a family having the same wife, but this custom is not widespread. The country is divided into 4 dists.: Chien Tsang (which includes Lhasa), Hou Tsang, Ali, and Chamdo Area. The real rulers of T. are the Lamas, whose authority is vested in the Dalai Lama at Lhasa, who is concurrently a Vice-Chairman of the National People's Congress in Peking. At Lhasa there is a national assembly, or *Tsongdu*, which settles all the important affairs of state, and is responsible for the country's relationship with the Peking gov.

The mysterious land of T. from very early days was the objective of explorers. Its inaccessibility and the exclusiveness of its inhab. merely operated as a spur to explorers, who knew that the rivs. which have their source within its mt fastnesses have become the sacred rivs. of Hinduism and that the country was also the site of many of the most sacred shrines of Buddhism. Up to the time of the Brit. expedition of 1904 no European had succeeded in penetrating to Lhasa. In 1894 foreigners were allowed to advance as far as Yatung to the N. of the Himalayan state of Sikkim for trade, but the trade with what, before 1947, was Brit. India always remained small. T. continuing to derive the bulk of the tea it consumed in the form of brick tea by difficult routes from W. Szechwan. T. and India were linked by telephone in 1922. A line also exists between Lhasa and Gyantze. The whole area of T., excluding the Chamdo Area, is 349,420 sq. m., with a pop. of 1,273,969 (1954), including Chinese and Mongolians, and Tibetans in the Chamdo Area. The majority live in the dists. between Lhasa and the Chinese border.

History. Of the early hist. of T. little is known. In 639 Srongtsan Gampo founded Lha-Idan, which later became Lhasa, and also introduced Buddhism into the country. In 641 Srongtsan married Princess Wen Cheng of the T'ang Imperial House; her statue is still kept in the Potala in Lhasa. Tributes were paid to the Chinese court as late as 672; but from 676 onwards T. made successive raids on the NW. border of China. In 821 a peace treaty between China and T.



E.N.A.

TIBET: THE SHEKAR-DZONG, OR LAMASERY OF SHINING CRYSTAL

Tibet' road via Simla. But the most important route from India is from Kalimpong (Darjeeling dist.) across the Dzelep La via the Chumbi valley to Phari and thence by motor road to Lhasa. From Lhasa 2 motor roads were built in 1955: one strikes N., passing the Tsaidam basin to join the railway junction at Lanchow in Kansu; the other goes due E. via Chamdo and Tatsienlu (Kangting) to Chengtu, the railway centre in Szechwan. Tatsienlu is an important entrepôt of trade and lies on the ethnographic frontier between T. and China. Here the wool of Tibetan sheep is exchanged

was agreed, the terms of which were inscribed on a huge stone tablet. Chinese annals record that T. declined in 866, probably due to constant warfare with its W. neighbours. From the 5th to the 10th cents. T. was a monarchy, which eventually disintegrated owing to opposition among the nobles to the increase of temporal power among the priesthood. This period of disunion lasted from the 10th to the 13th cents. The greatest figure of this time was Atisha, the Indian Buddhist, who came to T. in 1026. In 1253 all the E. part of the country was conquered by Kublai Khan, and it was he who first placed the gov. in the hands of the lamas. The first priest-king was the abbot of the Sakya lamasery, but in the 17th cent. the Sakya line was overthrown by Nga-Wang Lob-sang, abbot of the Drepung lamasery, and he inaugurated the present line of rulers, the Dalai Lamas. In 1417 there was b. in Kansu the founder of the Yellow Church, Tsong-Kapa, who went to T. in 1431 and studied in the Sakya monastery of Tsashi Lhünpo. He reformed the old Red Cap Church and imposed a strict code of morals on the priesthood. His 2 great disciples, Ganden Truppa and Kuchi Nima, became the first Dalai Lama and the first Panchan Ngöerhtehni, whose successors have ever since been regarded as direct reincarnations of the 2 Lamas. It was not until 1720 that the country was finally brought under Chinese rule. In 1774 Warren Hastings made amicable contacts with the Tesho Lama, then regent of T. But these came to nothing of a permanent nature owing to Tibetan suspicion that the English had fomented a Nepalese invasion of T. in 1792, and throughout the 19th cent. it proved impossible to come to any sort of agreement at all. India had always been anxious to open up trade with T., and between 1872 and 1886 3 different missions were organised, but were abandoned. In 1888 the Chinese invaded Sikkim and a military expedition was sent to drive them out, which resulted in a treaty (1890-3). The lamas not having been consulted in the matter, they took offence, and revenged themselves by trying to bring about a treaty with Russia. Further inroads were made into Sikkim, and Lord Curzon, then viceroy of India, came to the conclusion that strong measures were necessary. Col. (afterwards Sir) F. E. Younghusband was sent with an escort to see if he could come to terms, but he was unable to do anything. It was then decided to send an armed expedition, and in Dec. 1903 Col. Younghusband, with Gen. Ronald Macdonald in command of the troops, set out, and after some severe fighting they reached Lhasa on 3 Aug. 1904, and the Dalai Lama fled. Peace was concluded in Sept. by a treaty which provided against further incursions into Sikkim and estab. Brit. trade marts, and also prevented any foreign power receiving concessions in the country; the Tibetans also had to pay an indemnity. A treaty with Russia was concluded in the following year, in which it was agreed that no concessions should

be sought by either power, and no expeditions dispatched without the consent of both countries, for a term of 3 years, and Chinese suzerainty over T. was recognised. In 1908 the Dalai Lama was reinstated in Lhasa by Chinese authority; but in 1910 he was deposed and fled to Brit. protection in India. After the Chinese revolution of 1911 the Chinese agreed (1912) to leave the country and the Dalai Lama returned. In July 1912 the Chinese Gov. sent out another expedition with the object of reconquering T., but in consequence of a memorandum sent to China by the Brit. Gov., drawing attention to the Anglo-Chinese treaty of 1906, it was withdrawn. A conference was held at Simla, 1913-14, between England, China, and T., but the convention which was then drawn up assuring autonomy to T. was not ratified by China. Further trouble arose between T. and China in 1917, and in 1920 Sir Charles Bell (Brit. representative in T.) was invited to negotiate a peace at Lhasa. No final settlement was reached.

In 1933 the thirteenth Dalai Lama d., and a regent assumed control. In 1939 a new and very youthful Dalai Lama was discovered and installed with all the customary ceremony. The Tibetan Gov. admitted to Lhasa a Chinese mission of condolence on the death of the thirteenth Dalai Lama, and since 1939 the Rep. of China has had a commissioner at Lhasa. The regent, who acts on behalf of the minor Dalai Lama, the temporal and spiritual head of the country, is assisted by a council (*Kashag*) of 4 ministers (*Shapes*). There is also a national assembly (*Tsongdu*), an advisory body containing most of the monastic and lay officials. In 1950 the Peking Gov. sent an army from Szechwan to T., but halted it at the border. The Panchan Lama pledged his loyalty to the new gov. and went to Peking via Chinghai. The Dalai Lama was urged to send his representatives to Peking for negotiation, and an agreement was reached in May 1951, in which, *inter alia*, the Peking Gov. granted the Tibetans the right of national regional autonomy within China. Peking, however, retains its right of defence and foreign affairs. In 1954 both Dalai Lama and Panchan Lama went to Peking as Tibetan representatives in the National People's Congress and were elected Vice-Chairmen of the Congress. In Dec. 1956 both toured India as a goodwill mission and returned to T. in Feb. 1957.

Archaeology. An examination of the wooden pillars in the halls of the 2 famous temples of Lhasa, the Tsuglakhang and the Ramoche strengthens the supposition that both buildings are the work of Nepalese craftsmen of about the 13th cent. Only a few of the old frescoes are traceable, having been repainted in recent times. In Yerpa, on the road to Ganden, in a valley which opens a few m. E. of the capital on the R. Kichu are some very fine statues dating from the 12th cent. and believed to be either Indian or influenced by Indian art. The place is famous from the fact that a great Indian teacher, who played a prominent part in

introducing Buddhism into T. in the 13th cent., passed much of his lifetime in that wilderness. In Ganden is the tomb of the reformer. Tsong-kapa, founder of the Yellow Church. The Kichu, where it enters the Tsampo (Tibetan name for the Brahmaputra), passes a number of places of much historical interest, such as Ramagan, with 9th-cent. inscription; Usan, where the famous 9th cent. Sanskrit-Tibetan dictionary was written; Samye, built in the 8th cent., noted for its temple inscriptions and statues of Indian workmanship. In the valley of On are 2 notable lamaseries: that of Ngari Tak-teang of the T'ang period, and that of Choding, famous as the habitat of Tsong-kapa. Some distance to the NE. is the lamasery of Zinchi, sacred to Tibetans for the image of Maitreya—the Buddha to come who now dwells in a heaven, awaiting his descent upon earth. Southward along the R. Chonghie, lies Changhie, where in the stronghold of the local 16th-cent. prince the fifth Dalai Lama was born, one of the leading personalities of T. According to tradition the tn is famous for the tombs of the Tibetan monarchs: they are natural hillocks eroded by the waters and then adapted by man. One of them is the tomb of Srongtsan Gampo, the real founder of the Tibetan power in the 7th cent. (see 'Hidden Treasures of Tibet,' by Prof. Giuseppe Tucci, in *The Times*, 19 July 1949).

Literature. Tibetan literature began with the introduction of Buddhism and the trans. of the Indian classics. A second period began in the 15th cent., mainly under Chinese influence, but Tibetan literature has never lost its religious character. Two of the most sacred books are the *Kangyur*, or the Canon of the Buddhist Law, trans. from the Sanskrit, and the *Tengyur*, a commentary upon the Canon in 225 vols. It is not known when printing or xylography was introduced into T. The text is printed from wood blocks on large sheets of paper, which are not bound, but placed between boards and wrapped in silk. A Tibetan book may weigh some 30 lb. Apart from the sacred writings, T. is rich in folk-lore, short stories, and fables, handed down orally from generation to generation. The love of theatrical performances among the Tibetans has produced a stock of religious, historical, and fairy plays.

Art. Tibetan painting is a sombre reflection of Lamaism, the earliest portrait being that of the goddess Tara, dating probably from the 10th cent. The demonic subjects of Tibetan paintings are generally luridly depicted, while later Lamaistic paintings of a lighter character lose even this distinction, and have been pronounced as merely 'provincial Chinese art.' Tibetan architecture from an early time assumed an imposing style. Whence it originated is not known. It is distinguished for its solidity and massive design. Of old buildings still standing, the Jo Khang, the Lhasa Cathedral, and the huge lamasery of Samye may be mentioned. In the applied arts great

skill and beauty were attained in the production of metal-ware, jewellery, and decorated swords. Most household utensils are of metal, chiefly copper, or wood, and the best worked metal-ware comes from the Derge dist. of Kham.

See Sven Hedin, *Central Asia and Tibet*, 1903, and *Trans-Himalaya*, 1909-13; F. Grenard, *Tibet: The Country and its Inhabitants* (Eng. trans.), 1904 (contains a long general account of the country); Sir F. E. Younghusband, *India and Tibet*, 1910; P. Sherap, *A Tibetan on Tibet*, 1926; Sir Charles Bell, *Tibet, Past and Present*, 1927, and *The Religion of Tibet*, 1931; S. N. Wolfenden, *Outlines of Tibeto-Burman Linguistic Morphology*, 1929; H. Forman, *Through Forbidden Tibet*, 1936; M. Pallis, *Peaks and Lamas*, 1940; A. Gibbaut, *Tibetan Venture*, 1947; E. Wentz (ed.), *Book of the Dead*, 1950; articles in *China Reconstructs*: Fan Chih-lung, 'From Tibet to Peking' (Feb. 1955), Chang Po-chun, 'First Highways to Tibet' (May 1955); F. M. Bailey, *No Passport to Tibet*, 1957.

Tibetan Hound, a new breed of dog, used in Tibet as a watch-dog; it is a very powerful animal with a long coat. Mentioned in old Chinese literature and by Marco Polo, the T. H. is regarded as the ancestor of many present breeds.

Tibeto-Chinese Languages, see LINGUISTIC FAMILIES.

Tibia, the larger of the 2 bones in the lower part of the leg and popularly called the shinbone. It articulates with the femur above to form the knee joint, the fibula externally at its upper and lower ends, and with the astragalus below, forming the ankle joint.

Tibullus, Albius (c. 54-19 BC), Rom. poet, was descended from an equestrian family, whose estate was at Pedum, between Tibur and Praeneste. In the year 28 BC he followed his patron, Messalla, into Aquitania and thence into the E., but was taken ill at Coreyra and had to return. His poetry, addressed to 2 mistresses under the names of Delia and Nemesis, has little ardour, but is marked by its air of gentle tenderness and self-abnegation; on the other hand, his bucolic elegies are some of the sweetest and best in the Lat. language. Horace was warmly attached to him. His tender elegiac love poems, by their limpid clearness and remarkable finish, seem to justify Quintilian in putting T. at the head of all elegiac poets. The text of the poems was ed. by J. P. Postgate in Oxford Classical Texts, 1905, and with a trans. by him in the Loeb Library, 1912. See W. Y. Sellar, *Horace and the Elegiac Poets*, 1892.

Tibur, see TIVOLI.

Tic Douloureux, see NEURALGIA.

Tichborne Case, one of the most celebrated trials in the annals of the Eng. criminal law. The prisoner, Thomas Castro, otherwise 'Bullocky Orton,' the big butcher of Wapping, was tried and convicted for perjury in putting forward in the civil courts a bogus claim to the Tichborne title and estates (1872). Not only did Orton, in posing as Sir Roger Tichborne, son of Sir J. F. Doughty

Tichborne (*d.* 1862), answer with astonishing skill every question put to him in the civil actions, but even the real Tichborne's mother at first 'identified' him as her missing son. The whole proceedings cost the Tichborne family some £70,000 in legal expenses. In 1874 Castro was sentenced on 2 counts to 2 cumulative terms of 7 years' penal servitude each. See J. Brown, *The Tichborne Case Compared with Previous Impostures*, 1874; Lord Maugham, *The Tichbourne Case*, 1936; M. Gilbert, *The Claimant*, 1957; D. Woodruff, *The Tichborne Claimant*, 1957.

Ticino (Ger. Tessin): 1. Canton of Switzerland, lying on the S. slopes of the Alps. Area 1088 sq m. In the S. it merges into the Lombard plain. It is watered by the Ticino and its tribs. Cereals, tobacco, fruit, chestnuts, vines, and silk are cultivated. It was taken by the Swiss from Italy in 1512 and joined the League in 1803. Cap. Bellinzona (q.v.). Pop. (1955) 179,600, It. speaking, mainly Rom. Catholics.

2. Riv. of Switzerland and N. Italy, which rises in the above canton, follows the St Gotthard road and railway, flows through Lake Maggiore and between Piedmont and Lombardy, and joins the Po 3½ m. SE. of Pavia. Length 150 m.

Ticinum, *see* PAVIA.

Tickell, Thomas (1686–1740), poet, b. Bridekirk, Cumberland. Educ. at Oxford, he was appointed prof. of poetry there in 1731. His complimentary verse *Rosamund* brought him into touch with Addison, who, on becoming secretary of state in 1717, made T. his under-secretary. He wrote much minor verse, his longest work being *Kensington Gardens*, 1722, his most popular *Lucy and Colin*, 1725, his finest, the elegy prefixed to his ed. of Addison's works, 1721. See R. E. Tickell, *Thomas Tickell and the Eighteenth-century Poets*, 1685–1740, 1931.

Tickhill, urban dist., tn and par. of the W. Riding of Yorks, England, 6 m. S. of Doncaster. There are ruins of a Norman castle, an Augustinian priory, a 13th-cent. hospital of St Leonard, and a 14th-cent. church. Pop. 2500.

Ticks, or Ixodidae, family of Acarina (Mites), with flat bodies protected by horny shields. During part of their existence they are blood-sucking parasites on animals and birds, for which they have developed a rostrum or beak composed of 2 barbed harpoons above and a dart below. Eggs are laid on rough herbage and hatch into white 6-legged larvae, which climb up the legs of passing animals and in some species complete their life hist. on the coat, but in others return to the grass for a period. T. cause irritation and anaemia, but their chief danger to their hosts is in the introduction of parasitic protozoa, causing such diseases as Texas fever and redwater.

Ticonderoga, vil. of New York, U.S.A., in Essex co., situated NW. of Lake George, with manufactures of paper and wood-pulp. Graphite is found near by. During the Fr. and Indian War T. was unsuccessfully attacked by Gen. Abercrombie, and Gen. Howe was killed here

in 1758. It was taken, however, by Amherst in 1759. In the War of Independence it was taken by Americans under Ethan Allen (q.v.) in 1775, retaken by Gen. Burgoyne, on whose surrender it was abandoned, and reoccupied by the British in 1780. Pop. 3500.

Tiouanas, Indians found in Brazil and Peru around the confluence of the Javari and Marañón.

Tidelands Oil. For years the ownership of off-shore resources along the U.S. coast-line has been a subject of controversy. The coastal states have maintained that the submerged lands and the resources which they contain, lying within the 3-mile limit controlled by the states under international law, are the property of the state concerned. The U.S. Supreme Court has taken the position that such lands and resources are Federal property. In 1945 the submerged lands and their resources were declared a naval petroleum reserve by President Truman. In 1953 President Eisenhower passed a bill which gave the coastal states title to all submerged lands which lay within their historic boundaries, with rights to develop whatever resources lay therein. There was much criticism of the bill by Democrats.

Tidemand, Adolf (1814–76), Norwegian genre painter, b. Mandal. From 1832 to 1837 he was a pupil at the Copenhagen Academy and later at Düsseldorf under Hildebrandt and Schadow. T. settled at Düsseldorf in 1846, where he contributed much to the fame of the Düsseldorf School, and was a friend of his compatriot Hans Gude. Together with him T. painted 'Night Fishing', 1851, 'Funeral on Sogne Fjord', 1852, and 'The Marquess of Lansdowne.'

Tides, regular disturbances of the fluids on the earth, produced by the action of the gravitational forces of the moon and sun. The earth, having a diameter of about 8000 m., is subject to a stress due to the different degrees of gravitational pull. Some evidence of tidal action in the atmosphere is barometrically shown, but even in the tropics, where it is greatest, the difference in pressure never reaches 0.1 millibars. The oceanic waters are markedly disturbed, and the predominating influence of the moon is shown by the usual interval of 24 hrs 51 min. between similar phases being identical with the average interval between 2 successive passages of that body across the meridian. The following elementary investigation shows some of the quantitative results of tidal forces.

The Tractive Force. Let E and M be the centres of the earth and the moon, respectively, and let a plane through E and M intersect the surfaces of the earth and moon in the circles NHZH' and QR, this plane lying in the plane of the paper (Fig. 1). Let r be the radius of the earth which will be assumed to be a sphere, and let ME, the distance between the centres of the moon and the earth, be R . Take any point P on the circle ZHNH' and join P to E and M. Draw a line PL parallel to EM and let the angle PEM be

ϕ , which is also the angle NPL, N being any point on the extension of the line EP. PT is the tangent to the circle at P, and the attraction of the moon on the waters at P can ultimately be resolved into two forces, one along PT and the other along PN. The former is known as the *tractive force* and is responsible for the T, the other force merely diminishing to a very small extent the weight of a body or of an arbitrary volume of water on the earth's surface at P. It can be shown that the tractive force varies as $\sin 2\phi$, and its magnitude can be computed by assigning various values to ϕ . Thus at Z, a point directly under the moon, since $2\phi = 0^\circ$, it follows that the tractive force is zero, and the same applies at N, the nadir, because at N $\phi = 180^\circ$, and hence $\sin 2\phi$ is zero. For this reason at points on the earth's surface where the moon is overhead, and also at the corresponding nadirs, there is no tractive force. In addition, at H

miles and R is 240,000 miles, then $r/R = 1/60$, and $2r^3/R^3 = 0.000000114$, so that the weight of a body on the earth directly under the moon or at the nadir of this point is diminished by about 11 parts in 100,000,000. For example, if we take a ship of 25,000 tons displacement, that is, 56,000,000 lb., its loss of weight in the above circumstances would be a little over 6 lb.

If we want to find the corresponding diminution caused by the sun's differential attraction on a body on the earth's surface, for r/R we take the ratio of the earth's radius to its distance from the sun, which is 0.0000426, and M/m , the ratio of the mass of the sun to that of the earth, which is 333,434, and the corresponding differential attraction is $2 \times 0.0000426^3 \times 333,434 = 0.0000000515$ or about 5 parts in 100,000,000, which is less than half that due to the moon. The combined pulls of the sun and the moon at full moon or new moon is, therefore, equiva-

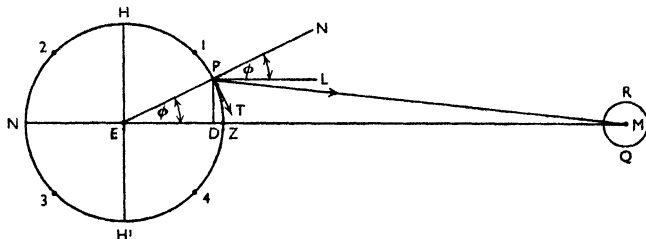


FIG. 1. TIDE-RAISING FORCE AND TRACTIVE FORCE

and H' where $\phi = \pm 90^\circ$ and $2\phi = \pm 180^\circ$, there is no tractive force because $\sin 180^\circ$ is zero. Obviously the tractive force attains a maximum when $\sin 2\phi = \pm 1$, and hence it is a maximum when ϕ is 45° , 135° , 225° , or 315° , which correspond to the points marked 1, 2, 3, 4, respectively. Since $\sin 225^\circ$ and $\sin 315^\circ$ is each -1 , the tractive forces at each of these points is negative, in other words, directed from these points to the left, though at 1 and 2 being directed to the right.

This shows that the tractive forces tend to move the waters over the hemisphere HZH' towards the moon, while over the hemisphere HNH' they tend to move the waters away from the moon, but in each case this implies that the forces tend to produce high T. at the same time in 2 hemispheres.

The vertical force along PN finally reduces to the simple expression $gr^2(2 - 3 \sin^2 \phi)/81R^3$, where g is the value of gravity at the earth's surface. This Tide Generating Force (the T.G.F.) vanishes when $\sin^2 \phi = 2/3$, or $\sin \phi = 0.8165$. Hence the T.G.F. is zero when ϕ is $54^\circ 44'$, $125^\circ 16'$, $234^\circ 44'$, and $305^\circ 16'$. It attains a maximum when $\phi = 0^\circ$ or 180° and is then $2gr^2/81R^3$; the factor $1/81$ is the ratio of the moon's mass to that of the earth. If r is 4000

lent to a diminution of the earth's gravity by 16 parts in 100,000,000, so that the loss of weight of a ship of 25,000 tons displacement in the above two cases would be 9 lb.

The problem of the T. is one of the most difficult in the whole range of dynamical astronomy, and an adequate account of the subject is quite beyond the scope of this article. Something may be said, however, about Bernoulli's *equilibrium-theory*, which, it must be pointed out, is not only inadequate but is based on erroneous principles which give high water under the moon, irrespective of the depth of the water. Bernoulli supposed the earth to have a spherical solid nucleus surrounded by a shell of water of uniform depth, and his theory is briefly as follows:

Fig. 2 shows clearly the combined effects for the statical problem with a uniformly ocean-covered earth and no friction. At new and full moon both bodies are attracting in nearly the same line and give spring tides (left hand); at first and last quarter the attractions are at right angles, and high tide appears under the moon; low, under the sun. These are the neap T. Spring T. which occur at new and full moon, give a higher tide than the average, and also a lower one than the average; neap T. at the quarters are lower at high, higher at low tide, than the

average. The prin. tide here being that due to the moon, the sun raises the low at the expense of the high T. When the moon is in perigee spring T. are higher, and if this occurs about 1 Jan., when the earth is nearest the sun, the highest T. are produced; in each case low tide is correspondingly reduced. The relative heights of spring and neap T. are about 7:4.

Rise and Fall. Since the earth with its waters is rotating, every place as it comes under the influence of external attraction has its waters gradually lifted to a maximum, then gradually dropped to a minimum. The *flowing* or *flood tide* is the former, the *ebb-tide* the latter movement. Alternating high and low T. should occur, according to Fig. 3, twice each in 24 hrs; actually the average period is 24 hrs 51 min., since during the rotation the moon travels forward in its orbit, so that a place carried by the earth's rotation from high tide position completes

its antipodal crest in the S. A sublunar place is carried round by the earth's rotation in a plane inclined at an angle to the diameter forming the crests, so that its record high tide is not at the antipodal crest but to one side of it, the second high tide being thus less than the first; this is known as the diurnal inequality.

The *theory of tides* has been worked out very completely by Sir George Darwin, with very many interesting and important results. For example, Lord Kelvin concluded, from an analytical study of 33 years' observation, that the earth as a whole must be more rigid than steel, but perhaps not quite so rigid as glass. The friction due to T. involves a loss of energy obtained from the earth's energy of rotation, and tends to retard it, thus lengthening the day by about 1 sec. in 120,000 years according to Dr H. Jeffreys' theoretical investigations, confirmed by Dr J. K. Fotheringham's work on the

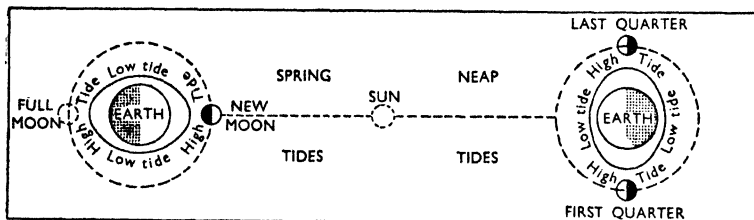


FIG. 2. OCEAN TIDES

a full rotation, but has to travel in addition another 12° or $\frac{1}{2}$ hr before coming again under the moon.

Priming and Lagging. The T. *prime*, or arrive early, at the time of spring tide, the average interval being about 24 hrs 38 min.; at neap tides the interval averages 25 hrs 6 min., and the T. *lag*. These differences are due to the conjunction of solar and lunar T. At new and full moon, when these T. coincide, the crest would be under the moon; at quadrature the solar wave crest and trough combining symmetrically with the lunar trough and crest respectively, produce merely a difference in height, not a displacement. In other positions displacement will occur owing to the combination of the lunar and solar crests. This gives high tide if the sun's influence is exerted to the W. of that of the moon, about $\frac{1}{2}$ hr ahead for the angle 45° , 3 days after full or new moon. The $\frac{1}{2}$ hr is gained from diminished intervals for the 3 preceding days. When the solar crest occurs to the E. of the lunar within a quadrant, the combined crest is found farther E. and is reached later by a similar interval, giving lag.

Diurnal Inequality. Twice a month the moon being at its farthest point N. (28°) of the celestial equator, the tidal wave crest is found in the N. hemisphere,

times of anet eclipses. This retardation of the earth's axial rotation implies less angular momentum in the earth-moon system, and to maintain the constance of this angular momentum the moon must recede from the earth, thus lengthening the month. This forms the basis of Sir George Darwin's *tidal evolution* theory, which thus accounts for planets having receded from the parent body after separation.

Actual Tides. The configuration of land and water, and the varying depth of the latter, are the chief elements in completely upsetting calculations from theory. High T. occur at all intervals before and after the meridian noon in different places. For any port the mean interval is known as the establishment of the port; at New York it is 8 hrs 13 min., with a variation of 22 min. either way during the month; at London Bridge it is 1 hr 58 min.; at Bristol, 7 hrs; at Yarmouth 9 hrs.

Height of Tides. In the open ocean no accurate determinations have been made, but 2-3 ft is the average height. Shallow seas, by diminishing the velocity, increase the height, which may be exaggerated again by entry into converging channels or estuaries. A hundred ft, it is said, has been recorded in the Bay of Fundy; at Bristol 50 ft is attained, yet the E. coast

of Ireland shows a range of only 2 ft. The effect of shallow water and projecting land, giving rise to reflection and interference, is to set up tidal currents, although the true tides give no displacement of water. Such currents entering riv. mouths give rise to the bore, elger, or mascaret. It has been sometimes stated in text-books that these currents may give rise to double T., as at Southampton, the falling T. of the channel driving through Spithead and the rising tide of the Solent each giving high water. This erroneous explanation has been frequently exposed, but is still repeated. The correct explanation, which is too long to be dealt with in this article, is given in standard books mentioned at the end.

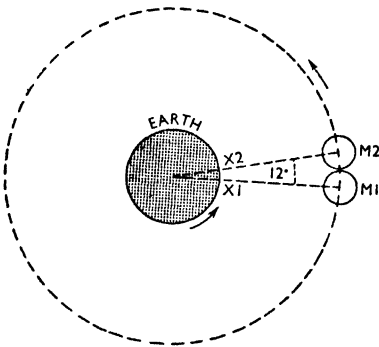


FIG. 3. SUCCESSIVE HIGH AND LOW TIDES

M1, first position of moon; M2, second position; X1, X2, tides.

Uses. Physiographically T. aid in the destruction of coast-line and help to carry debris to the sea; they prevent the formation of deltas, yet aid rivs. in building their lower flood plains. Biologically they have immense influence, the sea-shore 'between tides' having its peculiar life. Commercially they are useful in carrying vessels inland, and for the generation of electrical energy.

Absence of Tides. Though theoretically T. are produced in all bodies of water, they are often inappreciable; thus Lake Michigan has probably a tide of 2 in. Land-locked seas such as the Mediterranean and Baltic have usually very small T.

Tides in Relation to Practical Navigation. In navigating coasts where the tidal range is considerable, caution is always necessary; for there are in-draughts to all bays and bights, although the general run of the stream may be parallel to the shore. The turn of the tidal stream offshore is seldom coincident with the time of high and low water on the shore. In open channels the tidal stream ordinarily overruns the turn of the vertical movement of the tide by

about 3 hrs. forming what is known as tide and half-tide, the effect of which is that at high and low water by the shore the stream is running at its greatest velocity.

The tidal predictions given in Part I of the Admiralty's Tide Tables can generally be relied upon to give the times of high and low water within a few min. and the heights within a few tenths of a ft; times and heights at 'secondary' ports, found by means of the tidal differences given in Part II, are considerably less exact than those predicted in the tables for 'Standard' ports; times and heights found from the tidal constants may be considerably in error, and caution is advised, particularly in waters where diurnal inequality is great.

The data used on the charts of different nations vary considerably. That adopted for the Admiralty charts founded on surveys carried out by the surveying vessels of the R.N. is, in waters where the diurnal inequality is small, the level of mean low-water springs, and in waters where the diurnal T. are considerable the level of Indian spring low water. As, however, a very long series of tidal observations is required before either of these levels can be definitely determined and as the chart datum depends, in most cases, on a few weeks' observation only, the datum adopted must always be considered as approximate, and differs considerably in some cases from the theoretical datum. Where Admiralty charts are founded on the charts of other nations, the datum is that used by the original authority.

It has to be remembered by navigators that the tide may fall below datum, except in cases where the lowest possible low water has been used as datum. In waters where diurnal inequality is small the lowest tides usually occur when the moon is near perigee and near the equator at springs, or at about the equinoxes; where diurnal inequality is great the lowest tides usually occur when both the moon and sun are in high declination at springs or at about the solstices. Wind or a high barometer may also reduce the height of the tide and cause it to fall below datum. (*Admiralty Pilot.*)

See G. H. Darwin, *The Tides and Kindred Phenomena in the Solar System*, 1898; H. Lamb, *Hydrodynamics*, 1932; A. T. Doodson and H. D. Warburg, *Admiralty Manual of Tides* (H.M.S.O.), 1941; R. C. H. Russell and D. H. MacMillan, *Waves and Tides*, 1952. For tidal friction in shallow seas, see H. Jeffreys, *The Earth*, chapter xiv (2nd ed.), 1929; Martin Davidson, *From Atoms to Stars*, (3rd ed.), 1952, Appendix vi.

Tideswell, tn of Derbyshire, England, 6 m. E. of Buxton, in the Peak dist. It has a 14th-cent. church and an old grammar school. There are lead mines in the area. Pop. 2000.

Tidore, is. of the N. Moluccas, Indonesia; situated off the W. coast of Halmahera. The cap., Tidore, is on the E. coast. In the S. the is. is a symmetrical volcanic cone. It is fertile, producing cotton, maize,

fruits of various kinds, and spices. In the early 16th cent. the Portuguese captured the is., but in the next cent. it became a Dutch colony. Area, 45 sq. m.; pop. 19,000.

Tidworth, North, tn and par. of Wilts, England, 13 m. NNE. of Salisbury, a military centre. Pop. of par. c. 3000.

Tieck, Johann Ludwig (1773-1853), Ger. writer, b. Berlin; studied literature at Erlangen and Göttingen. After much travelling he became director of the Dresden theatre in 1819. T. was drawn to the Romantic school by the brothers Schlegel. He tried his hand in many fields: critical writings (*Dramatische Blätter*); poetry (*Romantische Dichtungen*, 2 vols., 1799-1800); drama (*Blauharl*, 1797, *Der gestiefelte Kater*, 1797, *Kaiser Oktavianus*, 1804); but he was especially successful as a writer of short stories. His *Phantasus*, 1812-17, is a collection of old tales and legends. In later years he freed himself from the romantic tendencies, and wrote many *Novellen*, which rank amongst his best work, as *Das Dichterleben*, *Der Tod des Dichters*. The novel *Der Aufruhr in den Cevennen*, 1826, remained incomplete. He also trans. *Don Quixote*, and continued Schlegel's trans. of Shakespeare. See R. Minder, *Ludwig Tieck*, 1936.

Tiel, tn in the prov. of Gelderland, Netherlands, on the R. Waal. It is the centre of a fruit-growing dist. and has a large jam factory. In the Middle Ages T. was a member of the Hanseatic League (q.v.) and an important trade centre. The tn was heavily damaged in the Second World War and lost some of its ant. buildings. Pop. 16,870.

Tiele, Cornelis Petrus (1830-1902), Dutch theologian, and scholar, b. Leyden. He was prof. of the hist. of religions from 1877 to 1901. His best-known works are *On the Elements of the Science of Religion*, 1897-9, and *Outlines of the History of Religion*, 1876. See life by J. H. de Ridder, 1902.

Tielt, old tn in the prov. of W. Flanders, Belgium, 16 m. SSE. of Bruges. Its belfry dates from 1275. Chief manufs. are linen, woollen, and cotton goods. Pop. 13,100.

Tienen (Fr. *Tirlemont*), old tn of Brabant, Belgium, 26 m. E. of Brussels; situated on the R. Gette at the crossing place of the main road from Cologne to the N. Sea. T. is most probably of Rom. origin. It was a busy mkt in the early Middle Ages. At present it is the seat of the most important sugar-refinery of the country, producing yearly about 600,000,000 lb. of sugar. There are also tanneries, breweries, and engineering workshops. Pop. 22,600.

Tien-Shan, or 'Tyan-Shan', oblast (prov.) of the Kirgiz S.S.R., on the S. border, including part of the Tien-shan mts (q.v.). It is the most important livestock region of the Kirgiz S.S.R. Chief town is Naryn. Pop. 105,000.

Tien-shan (*Thian-Shan*, celestial mts), mt system of Central Asia, forming part of the boundary between the U.S.S.R. and Sinkiang and extending NE. from

the Pamir to the W. fringe of the Gobi desert. The main range, including the ranges of Peter the Great, Trans-Alai, Kokshal-tau, and Sary-yassy, forms the border ridge of the High Plateau of E. Asia, to which they slope on the SE. In this chain, with a general elevation of 15,000-20,000 ft., are the chief peaks, Pobedy peak (24,406 ft.) and Khan-Tengri (23,620 ft.) and the largest glaciers, and it is crossed by passes at an elevation of 10,000-14,000 ft. On the NW. slope are a series of shorter fringing chains, running parallel to the main ridge. The general elevation of these minor chains is 10,000-19,000 ft. Forest rises to about 9500 ft.

Tientsin, municipality and port of the prov. of Hopei, China, at the junction of the Pailho with the Grand Canal, 76 m. SE. of Peking. It is the emporium for N. China, with an extensive trade. The exports consist chiefly of coal, skins, cotton, wools, ground-nuts, beans, peas, and dates. In the Chinese-Jap. conflict in July 1937 T. was bombed and occupied by the Japanese (22 July). Since 1950 it has become the chief centre of heavy and light industry in N. China. Area, 133 sq. m.; pop. (1954) 2,693,831.

Tiepolo, Giovanni Battista (1696-1770), It. painter, b. Venice. His earliest master was Lazzarini, a noted painter in his day, but it was the work of Paul Veronese and of Titian that chiefly influenced him. His earliest known pieces are those in the chapel of Sta Teresa in the church of the Scalzi at Venice. These pieces, in conception after the style of Piazzetta, have been criticised for affectation and wanton fantasy, but they have force and brilliance. His individual special gift was that of creating a luminous and aerial atmosphere in which he rivals Veronese. T. did a great deal of work on the huge ceilings and walls of the villas and palaces of Venice and its environs, and later, at Würzburg and at Aranjuez and San Sebastian in Spain. In 1737 he also did a number of notable works for the interiors of the Villa S. Sebastiano at Malmorana, near Vicenza, the chief being 'Scenes from the Iliad', 'Orlando Furioso', and 'Gerusalemme Liberata', in which he was assisted by his son, Giovanni Domenico (1727-1802). His best ceilings and frescoes in Venice are 'The Institution of the Rosary' (1739), 'The Triumph of Antony and Cleopatra' (Palazzo Labea). For sheer virtuosity T., last of the great Venetian fresco-painters, is unsurpassed. He d. in Madrid. See lives by H. W. Hegemann, 1940, and A. Morassi, 1943.

Tierra del Fuego (Land of Fire), group of is. separated from the S. extremity of S. America by the strait of Magellan. It consists of sev. large is., the prin. ones being called Tierra del Fuego or Isla Grande (area 18,500 sq. m.), Navarin, Hoste, Clarence, Santa Inez, besides a number of much smaller size, the most important of which contains Cape Horn at the extreme S. The highest peak is Mt Sarmiento (7500 ft.). T. is inhabited by savages of low type, who now number less than 1000. T. was discovered by

Magellan in 1520. Half of Tierra del Fuego Is., and the isles W. of it, belong to Chile, the rest forms an Argentine ter. (cap. Ushuaia) with an area of 8000 sq. m. and a pop. of 5050. Punta Arenas is cap. of the Chilean portion, Magellanes Ter. Large tracts of the Chilean Is. are devoted to sheep-farming, largely by Brit. subjects, and there are important fisheries. See H. Mielche, *Journey to World's End* (trans.), 1945; E. Lucas Bridges, *Uttermost Part of the Earth*, 1948.

Tiers Etat, see THIRD ESTATE.

Tiffin, city, co. seat of Seneca co., Ohio, U.S.A., on the Sandusky R., 40 m. SSE. of Toledo. It is the seat of Heidelberg Univ. Pop. 19,000.

Tiflis (Georgian Tbilisi), cap. of the Georgian Rep. in Transcaucasia, a major industrial and cultural centre of the U.S.S.R., situated on both banks of the R. Kura. It has diverse engineering (machine tools, equipment for food and textile industries, radio and telegraph equipment, etc.), food, and light industries, and is an important transportation centre (4 railway lines, airport, Georgian Military Road to Ordzhonikidze in N. Caucasus). It is the seat of the Georgian Academy of Sciences (founded 1935 as the Georgian branch of the U.S.S.R. Academy of Sciences, transformed 1941), a univ. (founded 1918), a conservatoire (founded 1917), an arts academy (founded 1875 as a school of painting transformed 1922), and other higher educational estab.; it also has a public library (1850), a Georgian (former Caucasian) museum (1867), and an opera and ballet theatre (1851). There are many treasures of Georgian architecture, including 5th-7th-cent. churches (St David's and Anchiskhat churches, and Zion cathedral), Lurdzhi monastery church (12th cent.), Metekhi Castle (1278-93), and Anchiskhat bell-tower (1675); there are also sev. interesting 19th- and 20th-cent. buildings. Known since the 4th cent. AD, since the 6th cent. it has been cap. of Georgia or E. Georgia. It became Russian in 1801, and was the seat of the Viceroy of Caucasus till 1882. It was cap. of the anti-Bolshevik Transcaucasian Federation (q.v.), 1917-18, of independent Georgia, 1918-20, of the Transcaucasian Federal Rep. within the U.S.S.R., 1922-36, and of T. Oblast within the Georgian Rep., 1951-3. T. is an old centre of Georgian culture (printing press in 1709, philosophic seminary in 1755, theatre in the 1790s, first newspaper in 1819); in the 19th-early 20th cents. it was the cultural centre of the whole of Transcaucasia (first Russian paper in 1828, Russian theatre in 1845, Armenian theatre in the 1860s). Politically it was one of the strongholds of Social Democracy in Russia. Pop. (1956) 635,000 (1st in Transcaucasia, 10th in the U.S.S.R.; 1897, 160,000; 1917, 264,000; 1926, 294,000; 1939, 519,000), Georgians, Armenians, Russians.

Tigellinus, son of a native of Agrigento, the minister to Nero's worst passions, and of all his favourites the most obnoxious to the Rom. people. On the

accession of Otho, T. was compelled to put an end to his own life. See Tacitus, *Annals* xiv, xv; *Histories* i.

Tiger (*Panthera tigris*), huge and powerful carnivore, peculiar to Asia, though absent from Ceylon, Afghanistan, Baluchistan, and Tibet. The Indian T. rarely exceeds 10 ft in length, and the female averages about 8 ft 6 in. Fine males weigh from 400 to 500 lb. Young animals, which are characterised by their canine teeth being hollow throughout, are handsomer than older ones, the tawny orange colour being richer and the stripes



Camera Press

TIGER CUB

darker and closer together. T.s are monogamous, though there is no reason to suppose that they pair for life. The period of gestation is 14 or 15 weeks, and from 1 to 6 cubs are born, though more than 2 are seldom reared. T.s will eat carrion, but generally kill for themselves. Their food consists principally of deer, antelopes, and smaller animals, but occasionally powerful ones are attacked, and they sometimes kill the wild boar. Man-eaters are not, as in the case with lions, old and worn out, and many are in splendid coat when killed after a meal on human flesh. The taste is generally acquired during a hunt from which the animal escapes after having mauled a man, but even man-eaters are known to hunt for other food. The T. has been crossed experimentally with the lion, the resulting hybrid, the *tigon*, is faintly striped; it is sterile. See R. G. Burton, *The Book of the Tiger*, 1933; R. I. Pocock, *Fauna of British India, Mammalia*, Vol. 1, 1939.

Tiger Beetle, see CICINDELIDAE.

Tiger-cat, see OCELOT.

Tiger Flower, see TIGRIDIA.

Tiger Lily, see LILY.

Tighina, see BENDERY.

Tighnabruach, tn of Argyll, Scotland, popular holiday resort, situated on the Kyles of Bute. Pop. 1000.

Tightrope Walker, see ACROBAT.

Tiglath-pileser, name of sev. anct Assyrian kings (see ASSYRIA). T. I (c. 1115-1103 BC) restored the declining Assyrian power by a series of campaigns which re-established control as far west as

the Mediterranean. T. III (745-727 bc), whose native name was Pulu, in extensive wars to keep open trade routes into Assyria, initiated a system of provinces owing allegiance direct to his court and enforced by the deportation of recalcitrant populations. T. recorded his actions on behalf of (Jeho)ahaz of Judah, and against Israel and Damascus. He also mentions Azariah, Pekah, Hoshea, Menahem, and Hiram (*see* O.T.). Sculpture from his palace at Nimrud (Calah) is in the Brit. Museum.

Tigranes, or **Dikran**, name of sev. kings of ant. Armenia, one of whom flourished as early as 550 bc, and was a friend of Cyrus the Great, helping to overthrow the Median empire. The best-known bearer of the name (c. 121-55 bc) was the son-in-law of Mithradates the Great. He was King of Armenia (c. 96-55 bc), and master of the Syrian monarchy from the Euphrates to the sea (83), founding the city of Tigranocerta. T. at first supported Mithradates against the Romans (76), but was defeated by Lucullus (69-68) and by Pompey (66).

Tigre, one of the 3 most important provs. in Ethiopia, bounded on the N. by Eritrea. It is a prin. source of hides and skins for export and also an important producer of grain, beeswax, and wool. Potash and sulphur exist in payable quantities. The tns of Axum, Adowa, and Adigrat are historically famous. Estimated pop. of prov. 1,000,000. The Tigreans are a Semitic race.

Tigridia, or **Tiger Flower**, genus of bulbous plants (family Iridaceae), natives of tropical America. They are grown in the cool greenhouse and also in warm borders, with winter protection. *T. pavonia*, Flower of Tigris, and its varieties are particularly beautiful.

Tigris, one of the 2 large rvs. of Iraq, the other being the Euphrates (q.v.). It rises in Turkey on the S. slopes of the Taurus range, and flows E. across Turkey through Diyarbekir, entering Iraq E. of Nusaybin. Thence it flows SE to Mosul and Samarra and then S. through Bagdad. It is joined by the Euphrates 50 m. NW. of Basra to form the Shatt-al-Arab, which flows into the Persian Gulf. Length 1150 m. Navigable as far as Bagdad.

Tihwa, **Tihwatu**, *see* URUMCHI.

Tikopia, a small is. in Melanesia, but whose inhabitants have a Polynesian culture. They have sacred chiefs and, although under 1500 in number, a highly complex social organisation based on patrilineal clans. *See* R. Firth, *We, the Tikopia*, 1936.

Tiksi, port in the T. Bay of the Laptev Sea, near the Lena delta, on the N. Sea Route (q.v.); it is a supply base of N. Yakutia, founded in 1934.

Tilburg, tn in the prov. of N. Brabant, Netherlands, 15 m. SW. of s'Hertogenbosch. It is a great industrial centre, manufacturing cloth, woollens, soap, leather, etc. There is a Catholic economic univ. (estab. 1927). Pop. 129,985.

Tilbury Fort and Docks, fortification in Essex, England, on the Thames opposite Gravesend, enclosed by a moat. Origin-

nally built by Henry VIII, it was enlarged by Charles II. The troops raised in anticipation of a Sp. invasion were reviewed here (1588). The docks (507 ac.), which lie 1200 ft above Tilbury Ness, opposite Gravesend, 26 m. below London Bridge and about the same distance from the Nore, were opened in 1886, and formerly belonged to the London and India Dock Company, but are now under the control of the Port of London Authority. The great development of trade since 1886 has rendered frequent changes necessary. The latest extensions were begun in 1917, when the Port of London Authority extended the main dock 1450 ft. These extensions, which were completed in 1928-9 at a cost of £2,500,000, enable London to compete for the large ocean-liner traffic. They comprise a new entrance dock, 1000 ft by 110 ft with a depth of 4½ ft below T. H. W. at centre of sill, a floating structure, a dry dock 750 ft by 110 ft, and a passenger landing stage 1142 ft in length, at which vessels can be dealt with at any state of the tide, day and night. The dry dock is so constructed that it can be extended when necessary, without interference with its use, to a total length of 1000 ft. There are over 35 m. of railways in the Tilbury Docks. *See also* THURROCK.

Tilden, Samuel Jones (1814-86), Amer. lawyer and statesman, b. New Lebanon, New York. He was a famous Democratic leader, and in 1874 became governor of New York. He endowed a free library in New York. He was Democratic candidate for President, and was believed to be elected, but a special commission decided that the disputed votes of Florida, S. Carolina, and Louisiana should go to R. B. Hayes, his Republican opponent, who was thereupon declared president. *See* TAMMANY HALL and SOCIETY.

Tilden, Sir William Augustus (1842-1926), chemist who, after teaching chemistry at Clifton College for 8 years was made prof. of chemistry at Birmingham in 1880. He was later called to the Royal College of Science, London, and was elected a fellow of the Royal Society. His chemical work dealt mainly with the constitution of the terpenes (q.v.) and with various problems of physical chemistry.

Tilden, William Tatem, junior (1893-1953), Amer. tennis champion and author, b. Germantown, Pa. Educ. at Germantown Academy and the univ. of Pennsylvania he was world's champion of lawn tennis in 1920, 1921, and again in 1930, and with F. T. Hunter won the men's doubles at Wimbledon in 1927. He was for 10 years a member of the U.S. Davis Cup team. He wore the Amer. singles laurel for 8 years (1920-6 and 1929); he was clay court singles champion from 1922 through to 1927, and shared the national men's doubles title in 1923 and 1927. In 1930 he became a professional, and led the professional singles field in 1931 and 1935, and in 1945, at the age of 52, he and Vincent Richards won the professional men's doubles trophy.

Tile, thin plate of various materials, earthenware, porcelain, marble, glass, etc., used for roofing, flooring, walls, fire-places, etc. Roofing T.s of marble-coloured clay were used in aet Greece and Rome, coloured glazed roofing T.s were known in aet China and Japan, and unglazed red earthenware roofing T.s were used in medieval Europe. Floor T.s of medieval Europe, as much a branch of brick-making as of ceramics, were made of red earthenware often with a lead-glaze and slip decoration (see SLIPWARE). Large pavements of these T.s were mosaic in form. The use of earthenware T.s for wall decoration is of Near-Eastern origin, as early as Darius I, c. 500 bc. Painted specimens from Samarra (Mesopotamia) are of 9th-cent. origin, and dated examples from Persia go back to the 13th cent. The mosaic type of T. work, cutting to shape from slabs of tin-glazed earthenware, spread from N. Africa to Spain under the Moors. Sp. T.s with coloured glazes, lusted, stamped in relief, and painted, were made at Seville, Valencia, and in Catalonia, etc. The imported Sp. T.s led the Italians to imitate them and to create Maiolica (q.v.) T.s for flooring. But in the Netherlands, the maiolica technique was extended to pictorial representations extending over many T.s for wall and fire-place decoration and the great Dutch T. manuf. of the 17th cent. sprang up, favouring blue-and-white designs. These were copied in N. France, Germany, and England, where about 1756 at Liverpool transfer-printed decoration was used. Porcelain T.s were made at Meissen and Fürstenberg.

Till, see BOULDER CLAY.

Tillage, see CULTIVATION.

Tillamook Language, see NORTH AMERICAN NATIVE LANGUAGES, *Pacific Areas*.

Tillandsia (named in honour of E. Tillands, Swedish prof.), family Bromeliaceae, genus of 400 species of stemless herbaceous plants, natives of tropical and sub-tropical America, usually epiphytic. *T. usneoides* is Sp. Moss or Old Man's Beard, which hangs from trees in the tropics, sometimes used in stuffing birds. *T. utriculata*, wild pine of Jamaica, has leaves with expanded bases, retaining water as if in a bottle. Sev. T. are cultivated as pot plants or epiphytes in a warm greenhouse.

Tillott, Benjamin (1860-1943), Labour leader and politician; b. Bristol and began his career in a brickworks, later joining the R.N. Subsequently he organised the Dockers' Union, of which he became general secretary. T. largely organised the dock strike of 1889. He shared responsibility for the developments which placed the general labour unions in an equal position with the organisations of skilled craftsmen inside the Trade Union Congress. He was M.P. (Lab.) for N. Salford (1917-24) and president of the T.U.C. (1929). T. pub. a short hist. of the Dockers' Union in 1910, and his *Memories and Reflections* in 1931.

Tillicultry, police burgh in Clackmannanshire, Scotland, 4 m. from Alloa,

situated on the R. Devon at the foot of Ochil Hills. Industries are mining, paper coatings, stationery, and textiles. Pop. 3818.

Tillotson, John Robert (1630-94), Archbishop of Canterbury; b. Halifax, of a Calvinist family; educ. at Cambridge. He was at first a Presbyterian, but was ordained in 1660 or 1661, accepted the Act of Uniformity, and became chaplain to Charles II (1666). In 1672 he became dean of Canterbury, in 1675 canon of St Paul's, in 1689 dean of St Paul's, and in 1691 archbishop of Canterbury. He was strongly anti-Catholic, and pub. *Rule of Faith*, 1666, and 4 lectures on the Socinian controversy, 1693. His sermons are famous for their prose style, and are among the best examples of the pulpit oratory of his times. See selections ed. by G. W. Weldon, 1886, J. Moffat, 1926.

Tilly, Johann Tzerclaes, Count von (1559-1632), Ger. soldier, b. Tilly in Brabant and brought up by Jesuits. He served in the Sp. army in the Netherlands. Later, he left the Sp. service for Austria, and in 1607 became gen. of the Bavarian army and Catholic League, greatly distinguishing himself during the Thirty Years' War. He won the great battle of the White Mt. near Prague, in 1620, and was also victorious at Wimpfen, Stadtlohn, Wiesloch, and Kocust. In 1630 T. was appointed commander-in-chief of the imperial forces, and besieged and took Magdeburg, after a fierce struggle. Four months later, however, he was defeated by Gustavus Adolphus at Breitenfeld, and, shortly afterwards, on the banks of the Lech, where he was mortally wounded, and d. at Ingolstadt the following day. See Count Villermont, *Tilly ou la guerre de trente ans*, 1859; O. Klopp, *Tilly im 30-jährigen Kriege*, 1861, 1891-6; Keym Marcour, *Johan Tserclaes Graf von Tilly 1884*; life by G. Gildardone, 1932.

Tilman, Harold William (1898-), mountaineer, advocate of the small mobile Himalayan party, and leader of the 1938 Everest expedition. He had a distinguished record in the First and Second World Wars, has explored many mt. dists. in Africa and Asia, and led the first ascent of Nanda Devi in 1936. He has written *Ascent of Nanda Devi*, 1937, *Snow on the Equator*, 1938, *Mount Everest*, 1938, *When Men and Mountains Meet*, 1947, *Two Mountains and a River*, 1949, *China to Chitral*, 1951, and *'Mischief' in Palagonia*, 1957.

Tilsit (since 1946 Sovetsk), tn in the Kaliningrad Oblast of the Russian Federal Rep. (former E. Prussia), on the Niemen 65 m. NE. of Königsberg. It has a timber and paper industry. It was founded in 1288 by Teutonic Knights as a castle, and has been a tn since 1552. Here Napoleon I concluded treaties with Russia and Prussia in July 1807, by which Prussia lost her possessions W. of the Elbe, and Westphalia was formed out of W. Prussia and Hanover. Prussian Poland was assigned to Russia and Saxony, and the Tsar Alexander I was to join an alliance with Napoleon against England. Pop. (1939) 59,000.

Timaeus (c. 346-c. 250 BC), Gk historian, was the son of Andromachus, tyrant of Tauromenium in Sicily. He was banished from Sicily by Agathocles, and passed his exile at Athens, where he had lived 50 years at the time when he wrote the thirty-fourth book of his History. This, his greatest work, was a hist. of Sicily from the earliest times to 264 BC. See F. Jacoby, *Fragmente der griechischen Historiker*, vol. iii B, 1950.

Timaeus of Locri, Gk philosopher of the Pythagorean school, contemporary with Plato. To him is usually ascribed the work *Concerning the Soul of the Universe*, written in the Doric dialect. It deals with the same subjects as Plato's dialogue *Timaeus*.

Timaru, seaport and city of S. Is., New Zealand, on the E. coast between Christchurch and Dunedin, chief tn of S. Canterbury dist. The climate is equable, with little rain, and there are some 400 ac. of scenic and recreational reserves. It was the first N. Zealand tn to operate a tn-planning scheme. Industries include the manuf. of woollen goods, footwear, pottery, furniture, flour, and allied products, agric. implements, and engineering products and the frozen-meat industry is carried on near by. There is an airport, and a good harbour, the area of which was doubled during the Second World War. It became a city in Nov. 1948. Pop. 24,700.

Timber from dicotyledons or broad-leaved trees is known commercially as 'hardwood.' T. from Gymnosperm or coniferous, 'needle-leaved' trees is known as 'softwood.' These terms are long estab. and widely used and accepted. Not all hardwoods, however, are hard; some indeed, such as Balsa (*Ochroma lagopus*) from S. America, are extremely soft, much softer in fact than any softwood. Conversely, some softwoods are quite hard, Yew (*Taxus baccata*), for instance, being almost as hard as oak. There are many thousands of different hardwood species, and hardwoods are found in forested areas throughout the world. Softwood species, on the other hand, are numbered in hundreds, and although softwoods are found in many parts of the world, it is in the N. parts of the N. Temperate Zone that the great softwood forests are found—in Russia and Siberia, Finland, Sweden, and the lands round the Baltic, in SE. Europe and over the Atlantic, in Canada and the N. U.S.A. Softwoods are also well represented in mountainous regions S. of the 'Conifer Belt'—in the Himalaya, the Atlas Mountains, and the Mexican Highlands.

Hardwoods vary widely in all their properties. They vary most obviously in colour, from the white of holly to the black of ebony, with every shade of red, brown, and yellow in between. They vary in weight, from the 7 lb. per cub. ft. of balsa to the 80 lb. per cub. ft. of lignum vitae (*Guaiacum officinale*) from the W. Indies. Most hardwoods weigh between 35 and 80 lb. per cub. ft., the well-known T.s oak, mahogany, and teak weighing about

45 lb. per cub. ft. or rather less. Hardwoods vary also in their durability, their hardness, their working properties, their taste and smell, their stability, their resistance to abrasion or indentation. Their properties largely determine the use to which they are put. Unlike the hardwoods, softwoods vary comparatively little. They all weigh approximately 30 lb. per cub. ft. and are similar for the most part in colour. They are characterised by the difference in colour—marked in some species, less marked in others—between the spring-wood and the summer-wood. Their cellular structure is simpler than that of the hardwoods, and illustrates their more primitive origin and development. It also makes it more difficult for the expert to identify the species of softwood, and he will usually have to use a microscope. Hardwoods, with their more distinctive features and cell structure, are easier to identify, and a hand lens with a $\times 10$ magnification is usually all the expert requires.

Whereas over 200 species of hardwood are in use in Britain, mostly imported from many countries, 20 species of softwood at the most are in use. Indeed 6 or 7 softwood species account for the bulk of the wood we use. These are European Redwood and Whitewood, Douglas Fir, Western Hemlock, Canadian Spruce, Western Red Cedar, Litch Pine, and a few other species of pine and spruce. The prin. uses for T. are house building and other construction work, boxes and packing-cases, pit-props, railway sleepers, telegraph and transmission poles, joinery, flooring, ship and boat building, road and rail transport, furniture, civil engineering, small household articles, tool handles, beer barrels, chemical vats, cooling towers, shop-fittings, and a variety of other industrial, agric., and domestic uses. Hardwood is sold by the cub. ft. and softwood by the Standard of 165 cub. ft. In 1955 the U.K. imported 36,500,000 cub. ft. of hardwood and 1,269,000 Standards of softwood.

See also FORESTRY; TREE; and articles on individual trees. See W. S. Jones, *Timbers: Their Structure and Identification*, 1924; S. Itecond and R. Hess, *Timbers of the World*, 1943; H. T. Eyres, *Introducing Wood: Facts for all who handle it*, 1950.

Timber (in Law). In real property T. means oak, ash, and elm by general custom, and various other trees by local custom. It becomes important to consider what T. denotes when construing the powers of a tenant-for-life under a settlement (q.v.). A tenant-for-life, unless expressly authorised, is liable for *Waste*, and felling T. is an act of *Voluntary Waste*. Neither T. nor *germins* (i.e. T. trees under 20 years) may be cut by a tenant-for-life, except that he may cut *germins* for necessary thinning of overgrown plantations and, on recognised 'T. estates,' he may periodically cut so much T. as by local usage is regarded as annual fruits of the land so cultivated. By the Settled Land Act, 1925, the tenant-for-life, even

though impeachable for waste, may with the consent of the court, cut and sell T. ripe and fit for cutting, most of the proceeds of which must go to 'capital money' for the benefit of the inheritance, and the residue as rents and profits to himself; if not impeachable, he takes all the proceeds. A tenant-for-life, unimpeachable for waste, is entitled to the proceeds of sale of ornamental T., properly cut to preserve adjacent T.

Timbrel, or **Ta-obret**, Heb. musical instrument, like the modern tambourine.

Timbuktu, tn of the colony of Fr. Sudan, near the Sahara, 9 m. N. of the main stream of the Niger. Its position makes it a focus of caravan routes between Algeria, Morocco, and Tuab, and of traffic on the Niger, and it thus has considerable importance as a trade centre. It exports ostrich feathers, gums, salt (from Taudeni), and kola-nuts to Senegal, the Guinea Coast, and Morocco. Most of the houses are of straw and earth, but there are a few brick buildings, some mosques and schools, including a Muslim superior school, called a *médresa* (official), and a citadel and forts. René Caillé (q.v.) in 1824 approached the Niger at T., where his life was in constant danger. He was, however, not the first white man to discover T.; an Englishman, Maj. Laing, setting out from Tripoli, had reached this mysterious city of caravans and had been murdered there. In 1863 Faidherbe (q.v.), having routed his formidable adversary, El Hadj-Omar, lord of a vast region, concluded an agreement with the masters of T. But it was not until 1895 that Commandant Joffre (q.v.) seized the city and built a string of forts around it which have since then secured Fr. domination of this region. In 1904 it combined with Zinder-Chad to form the military ter. of the Niger. In 1920 it was formed into a military ter. incorporated in Upper Senegal-Niger, but in 1923 was converted into a civilian ter., under a Lieutenant-governor. Pop. 6500. See P. Martyr, *La région de Tombouctou*, 1920.

Timby, **Theodore Ruggles** (1822-1909), Amer. inventor; b. Dover, New York and passed his youth on a farm. In 1841 he exhibited, at Washington, a model of a revolving battery; in 1843 he made a model of a marine turret, but received little encouragement—either from the U.S. Gov. or from Napoleon III, whom he approached. He patented a turbine water-wheel, 1844, and, devised a method of firing heavy guns by electricity, 1861. In 1862 his idea of a marine battery was embodied in the ship *Monitor*.

'Time', Amer. magazine, correctly described by its subtitle as a 'weekly newsmagazine', founded at New York in 1923 by Henry R. Luce and Briton Hadden (d. 1929). It achieved as early as 1942 a circulation in excess of 1,000,000. In 1957 it had its own news-gathering bureaux in 15 cities of the U.S.A. and Canada, and 14 cities abroad, and issued not only Amer. and Canadian editions but 3 others, circulated overseas.

'Time and Tide', independent, non-party weekly review, founded in 1920 by

Viscountess Rhondda. Regular features include editorial comment and background articles on current politics, book reviews, financial notes, and criticism of theatre, films, music, and art. In the weekly *Notes on the Way*, to which well-known personalities of the day are invited to contribute, writers are allowed a free pen to discuss any subject they choose. Strongly anti-totalitarian, both in home affairs and foreign policy, *Time and Tide* has been banned in most Communist-ruled countries.

Time and Time Measurement may be determined by reference to some regular occurrence of any natural phenomenon. Thus the day is determined by the rotation of the earth on its axis, and the year by the periodic revolution of the earth round the sun. *Sidereal T.* is employed only in astronomical work, for definition of the *sidereal day*, which, unlike the solar day, is of constant length (see below). *Apparent T.* is taken from the apparent revolution of the sun, the mean solar day being the interval between 2 consecutive southings of the mean sun. The mean solar T. in any instant is the mean sun's hr angle, which can be converted into time by taking 15° as 1 hr, 15' as 1 min., and 15" as 1 sec. T. can be easily determined by travellers by observing the transits of known stars across known vertical circles. At sea different methods can be used. A simple method is to observe the altitude of the sun or a well-known star whose spherical co-ordinates are given in the *Nautical Almanac*. Then, the lat. of the place being known and also the Greenwich Mean Time (given by a chronometer or time signals), the local time can be computed. Local T. varies with the long. being 1 hr in advance of or behind the true Greenwich T. for every 15° to the E. or W. of Greenwich respectively. Owing to the confusion from the various local T.s, a standard T. has been introduced, the Greenwich T. being taken as the standard. This is known as *Greenwich Mean Time*, *Greenwich Civil Time*, or often as *Universal Time*.

Time Measurement. The ultimate standard to which all systems of T. M. are referred is *sidereal T.* The *sidereal day* is defined as the duration of a complete rotation of the earth on its axis relative to the stars. The *sidereal day* begins at a given place when the *First Point of Aries* (q.v.) is on the meridian. One of the duties of the Astronomer-Royal is to provide the nation, and, as we shall see, the civilised world, with a T. scale. A very accurate clock, known as the *sidereal clock*, is checked daily by astronomical observation of the instants when certain stars, known as clock stars, cross the meridian. In actual practice, T. is measured by the length of the *mean solar day*. A solar day is the duration of a complete rotation of the earth on its axis relative to the sun. The length of a solar day varies because the earth's orbit round the sun is elliptical and because the earth's axis is not perpendicular to the ecliptic (q.v.) or the plane of its orbit. For T. M. clocks are referred to the *mean solar day*,

which is divided into 24 mean solar hrs. The length of the mean solar day is constant, and it refers to the duration of 1 complete rotation of the earth on its axis relative to an imaginary body, the mean sun. The zero of this T. M. is the instant when the mean sun crosses the meridian at a given place. In England this place is chosen as Greenwich, and whereas the zero of T. M. was formerly referred to the instant at which the mean sun crossed the meridian in the cap. of a given country, it is now the practice for astronomers to refer all T. M.s to Greenwich. What is known as Greenwich Mean T. (G.M.T.) or Universal Time (U. T.) is T. measured from the zero of the Greenwich mean solar day. Formerly this day began at noon, but from 1 Jan. 1925, astronomers adopted a day of 24 hrs beginning at midnight.

The checking of G.M.T. from sidereal T. is a matter of astronomical computation (see *Whitaker's Almanack*). The advent of radio has simplified the regulation of clocks by means of the Greenwich standard clocks, since T. signals are broadcast.

Standard Times. Since 1883 the system of Standard T. by zones has been gradually accepted, and now almost throughout the world a Standard T. which differs from that of Greenwich by an integral number of hrs, either fast or slow, is used. A list of times in various regions of the world at 12 noon Greenwich Mean T. is given in the *Nautical Almanac* (ann.), and displayed in diagrammatic form in most good atlases. It is to be noted, however, that changes in standard T.s are often made without long previous notice, also that in the *Nautical Almanac* no account is taken of Summer T. In any country. Zone T.s have been adopted in various large countries. In Canada and the U.S.A. 5 standard T.s are used, the zones being bounded by meridians of long. 15°—the equivalent of 1 hr apart. Within each zone the mean T. for the meridian midway between each of the meridians 15° apart is kept. In the U.S.S.R. hourly zones from 3 hrs to 13 hrs fast on Greenwich time are used.

See also EQUATION OF TIME; HOROLOGY; METROLOGY. For Summer Time see DAYLIGHT SAVING; INTERNATIONAL DATE LINE; SUNDIALS. For T. in relation to space see RELATIVITY; SPACE.

Time Base, device for generating a voltage of saw-tooth waveform applied to the deflecting plates of a cathode-ray oscillograph (q.v.) producing an adjustable horizontal deflection of the spot with a quick fly-back at the end. It usually consists of a capacitor whose charge and discharge is controlled by a thyatron (q.v.) or hard-valve relay.

Time Constant. When electric d.c. supply of voltage E is switched-on to an inductive circuit of resistance R , inductance L , the magnetic field builds up gradually, the current rises exponentially according to the relation $i = \frac{E}{R} (1 - e^{-Rt/L})$, where e is the base of natural logarithms. The ratio L/R is the T. C. of the circuit, the time in which the final value E/R would be attained if the current continued

to rise at the initial rate. Actually the current reaches 10 per cent of full value in time $t = 0.1 L/R$, 50 per cent in $0.7 L/R$, 63 per cent in L/R , 95 per cent in $3 L/R$. Theoretically, final value is reached only after an infinite time, $e^{-Rt/L} = 0$ when $Rt/L = \infty$. When the supply is switched off the current decays according to the equation $i = \frac{E}{R} e^{-Rt/L}$, a curve sym-

metrical to the curve of growth with resp. to the t -axis, but starting at E/R . When the supply is switched-on to a capacitor C through a resistance R , the capacitor voltage rises according to the relation $e = E(1 - e^{-t/RC})$, the T. C. is RC .

The charging current is $\frac{E}{R} e^{-t/RC}$, starting

abruptly at E/R . A high resistance gives a large capacitive T. C. and makes the capacitor voltage rise slowly, but a low inductive T. C., making the magnetic field grow faster. Low resistance makes the current in an inductive circuit rise slowly. Inductance coils (chokes) are used for smoothing current variations. Field windings in generators are more quickly responsive to changes in voltage if the resistance is high.

Time of Troubles, see TROUBLES.

Time Series, see STATISTICS.

Timontel, Eleonora, see FONSECA.

Timer, see CHRONOGRAPH.

'Times, The,' daily newspaper, founded in 1785 under the title of the *Daily Universal Register*. John Walter I, the publisher, hoped only to establish himself as a book publisher by the promotion of a more economic method of type-setting, i.e. with units of words or groups of letters as well as single letters. The 'logographic' invention was a failure, but the news-sheet printed as an advertisement was a success. On 1 Jan. 1788 it was re-titled *The T.* In 1803 the management, and in 1812 the proprietorship, passed to his second son, John Walter II, under whom, assisted by the Napoleonic wars, the paper maintained its independence and secured a paramount position. In 1817 Thomas Barnes was appointed editor. He became the outstanding journalist of the century, and, as the champion of middle-class opinion, won for *The T.* the nickname of '*The Thunderer*.' John Walter III succeeded his father as proprietor in 1847. His editor, John Delane, claimed for the press a responsibility in national affairs that was conspicuously demonstrated by the newspaper's successful agitation for the proper equipment and care of troops in the Crimea. The competition of cheaper journals, after the repeal of the Stamp Act of 1855 was severe, but John Walter III refused to imperil the independence or inclusiveness of the paper. During the editorship of G. E. Buckle, *The T.* suffered a catastrophic reverse when it indicted Parnell on the basis of a letter secured in good faith, but found by the Parnell Commission (1889) to be forged. The reputation of the paper was damaged and its resources crippled. Arthur Fraser-Walker, chief proprietor 1894-1908 and chairman 1908-10, appointed as acting

manager C. F. Moberly Bell, who laboured to retrieve solvency. Nevertheless, family disputes made necessary the public sale of *The T.* in 1908. Though the Walter interest was retained, the paper came under the control of Lord Northcliffe, and through his efforts flourished without loss of independence. His first editor, Geoffrey Dawson (1912-19) directed the paper's demands for a vigorous prosecution of the War, and under H. Wickham Steed (1919-22) *The T.* contributed, in particular, to the success of the Washington Conference and the Irish settlement. On Northcliffe's death in 1922 the control was acquired by Maj. the Hon. J. J. Astor (now Lord Astor of Hever), in association with John Walter IV. Dawson returned to conduct the paper until 1941, to be followed until 1948 by R. M. Barrington-Ward. His successor, W. F. Casey, retired in 1952, when Sir Wm Haley became editor. Since 1785 *The T.* has been edited and printed on the same site, Printing House Square. The Koenig and Bauer steam press (1814), the Applegarth-Cowper 4-cylinder press (1828), and the rotary, reel-fed Walter press (1860) were all designed for and first used by *The T.* In 1932 the Times New Roman type was designed in the office specifically for the newspaper. The Mobile Printing Unit, a miniature printing office for use should aerial bombardment, for instance, threaten pub., was also designed in the office, and was exhibited at the British Industries Fair in 1953. The financial control of *The T.* is governed by a trust deed which prevents the sale of shares except with the assent of a body of trustees consisting of the Lord Chief Justice, The President of the Royal Society, the Governor of the Bank of England, the President of the Institute of Chartered Accountants, and the Warden of All Souls College, Oxford. See *The History of the Times*: vol. 1, *The Thunderer in the Making*, 1935; vol. 2, *The Tradition Established*, 1939; vol. 3, *The Twentieth Century Test*, 1947.

'Times Literary Supplement,' London weekly review, founded in 1902 and pub. by The Times Publishing Company Ltd. It owes its present position to the completeness of its coverage of the field of publishing and the scholarly nature of its criticism. It offers, besides book reviews, articles of interest to authors, publishers, and above all readers, on literary and allied subjects. Reviews and general articles are anonymous.

Timgad, anct Rom. city of Algeria in the dept. of Constantine, founded by Trajan about AD 100. Since the visit of James Bruce in 1765, T. has proved to be of great archaeological interest and importance. Extensive excavations have been carried out.

Timisoara, or Temesvá, city of Rumania, on the Bega. It was the cap. of the Banat, and is now cap. of the prov. of Timisoara. It was an important defence against the Turks, who captured it in 1552 and held it till 1716. In 1920, by the treaty of Trianon, it passed from Hungary to Rumania. It is strongly

fortified, and is the see of a Rom. Catholic bishop and a Rumanian Orthodox bishop, with a fine cathedral and castle. It is now an industrial and railway centre. The industries include textiles, brewing and distilling, chemicals, leather, and shoes. Its univ. was founded in 1945. Pop. (1948) 112,000.

Timmins, tn of Ontario, Canada, 268 m. N. of North Bay on the Temiskaming and N. Ontario Railway, and about 460 m. N. of Toronto. It is the centre of the Porcupine gold-mining area of N. Ontario. About 20 years ago it was only a rough frontier mining vil., but to-day it is a flourishing tn with all the facilities and amenities of a long-settled city. It has an additional source of future prosperity in the adjoining great clay belt of fertile agric. land estimated at 23,000 sq. m., where settlement has only begun. A feature of the tn is its large public park created in an area formerly occupied by unsightly mine-dumpings. Besides the large gold mines, there are sash and door factories, saw mills, and planing mills. Pop. 26,715.

Timoleon (4th cent. BC), Gk democrat, b. of the noblest families of Corinth. His whole life was spent in a ceaseless struggle for liberty, and in his youth this led him to the murder of his own brother Timophanes, who was trying to make himself tyrant of Corinth. In 345 BC the Gk cities of Sicily applied to Corinth for aid against the Carthaginians, and T. was sent with a small force. He took possession of Syracuse, and set about the estab. of democratic gov. in all the Sicilian colonies. Meanwhile the Carthaginians landed at Lilybaeum (339). T. was not able to collect more than 12,000 men, but with these he marched against the Carthaginian troops and totally defeated them. A treaty was concluded in the next year, and T. continued his work. The flourishing state of Sicily at the time of his death shows how beneficial was his influence. See Holden's ed. of Ptolemy's *Life of Timoleon*, 1889.

Timon the Misanthrope, Athenian who lived in the time of the Peloponnesian war. On account of ingratitude and disappointments which he believed himself to have suffered, he secluded himself from the society of all but his friend Alcibiades. He is the central figure of Shakespeare's *Timon of Athens*.

Timor, or Timur, is. of the Malay Archipelago, largest and most easterly of the Lesser Sunda group, Indonesia. In 1859 a treaty divided the is. between Portugal and Holland, the boundaries being finally arranged by arbitration in 1914. Portuguese T. includes the NE. of the is. with the Ocuasi enclave, and the is. of Atauro and Jaco, Dili being the cap. and chief port. Area 7386 sq. m.; pop. 438,000. Dutch T. (now Indonesian) comprises most of the SW., including the is. of Roti, Peman, Savu, Sumba, Alor, and E. Flores, with Kupang as the cap. Area 5765 sq. m.; pop. 450,000. The soil is dry and not very fertile, and the country mountainous. Mt Atlas (12,000 ft) and Mt Kabalaki (10,000 ft) being the

culminating peaks. Among the chief exports are coffee, cocoa, copra, sandalwood, bêche-de-mer, and cattle. A noted breed of ponies is reared here. Pearls have been found off the SW. coast. The staple article of food is sago. See H.M. Stationery Office, *Peace Handbook*, No. 80, *Portuguese Timor*, and No. 86, *Dutch Timor*, 1920. T. was occupied by the Japanese during Second World War. Dutch T. became part of Indonesia in 1950.

Timor-Laut, or Tanimbar, is. group in S. Moluccas, Indonesia, 205 m. ENE. of Timor (q.v.). The chief is. are Yamdena, Selaru, and Larat. Chief industries are agriculture, cattle-raising, and trepang. Area of group 2172 sq. m.; pop. 31,800.

Timoshenko, Semjon Konstantinovich, (1895-), Russian marshal b. of peasant stock in the vil. of Furmanka, on the old Russo-Rumanian frontier. Called up for military service in 1915, he fought in the First World War. Early in 1918 he was with the Black Sea Partisan detachment, a cavalry force fighting in the Crimea and against Kaledin's Don Cossacks. He later joined Budenny's First Cavalry Army and became a skilful leader of night attacks, and rose in this army to the rank of gen. In 1920 he was in the Russo-Polish campaign, and after the defeat near Warsaw he returned to the Crimea, where, at Perekop, he was defeated by Gen. Wrangel's troops and severely wounded for the fourth time. He now entered on his real career as a military leader, for at the Frunze Military Academy, which he entered in 1922, he qualified for high command after long and intensive study both there and at the Military and Political Academy for commanders and commissars, which he joined in 1930. T. became military representative at Kiev and Kharkov, stages in his career which had an important bearing on his achievements in the Second World War. It was T. who retrieved the Russian military position in the Russo-Finnish war of 1939-40. When the Germans invaded Russia, T., who, as Defence Commissar, had reorganised the Red Army and introduced reforms without which successful resistance to the Ger. armies would have been impossible, was entrusted by Stalin with the defence of Moscow. After he had repulsed the Germans, Stalin sent him to stem the enemy's advance in the Ukraine in Nov. 1941. The re-conquest of Rostov on 26 Nov. of that year was due to his masterly tactics and strategy. From 1939 to 1952 he was a member of the Central Committee of the Communist Party and was subsequently a candidate member. See W. Mehring, *Timoshenko Soviet Marshal*, 1942.

Timotheus of Miletus (c. 450-c. 360 BC), Gk lyric poet. He added an eleventh string to the lyre (or cithara) and thus incurred the displeasure of Athens and Sparta. Euripides wrote a prologue to his *Persians*. See F. Diehl, *Anthologia Lyrica Graeca*, 1949.

Timothy, St (d. 97), young friend and fellow-labourer of St Paul. He was a native of Lystra, his mother Eunice being

a Jewess and his father a Greek. He accompanied St Paul on the second missionary journey, and the lives of the two are henceforward closely connected. He was left as the apostle's representative at Ephesus, where he received 2 epistles from him. Eusebius says that he met his death there in a popular riot, after denouncing the worship of Artemis. His feast is on 24 Jan.

Timothy, Epistles to, form with the Epistle to Titus the group known as the Pastoral Epistles, which give detailed instructions for the appointment of officers and the pastoral care of the Christian churches. They show many points of contact with one another and with the other Pauline epistles, but there are numerous departures from the latter both in diction and subject-matter. They are private letters of an official nature. In spite of many attempts to disprove the Pauline authorship, the balance of probability still rests decidedly with the traditional view that they are by St Paul. The First Epistle was probably written on a journey up the coast of Macedonia c. AD 56 after Paul's release from his first captivity. The second epistle is placed during the second imprisonment of Paul, of which no record is given in Acts. The pastorals are strongly doctrinal. The Christian life must show no incongruity between creed and practice, and Christianity must be translated into ethical and spiritual terms. The Christian is to fight a good fight and expect suffering, and his swan song will be a song of victory. Other points are the unity of God; the inspiration of Scripture; and the danger of riches. The modern critical study of the Pastorals began in the early years of the 19th cent. with Schleiermacher, who denied Pauline authorship to 1 Tim. See B.S. Easton, *The Pastoral Epistles*, 1948.

Timothy Grass, common name of *Phleum pratense*, perennial grass, native of Britain, often grown for hay.

Timrod, Henry (1828-67), Amer. poet, b. Charleston, S. Carolina. Educ. at Franklin College, he studied law, but gave that up and became a schoolmaster. In 1860 he pub. a vol. of verse, and some of his war poems, such as 'A Cry to Arms' and 'Carolina,' were such an inspiration to the South in the Civil war that he was termed 'the laureate of the Confederacy.' The war ruined him in both fortunes and health. See G. A. Vauchope, *Henry Timrod, Man and Poet*, 1915; V. P. Clare, *Harp of the South*, 1936.

Timûr Beg, or Tamerlane (1335-1405), sultan of Samarkand, b. Kesk, of Mongol origin, a direct descendant of Genghis Khan. He assisted and then attacked Husein, Khan of N. Khorasan and Jagatai, finally supplanting him in 1369. He made Samarkand his cap. and rapidly made himself master of the whole of Turkestan and part of Siberia. He next attacked NE. Persia. After a series of bloody and cruel conflicts, the whole of Persia, Georgia, Armenia, and the neighbouring states accepted him as suzerain. Timûr then turned his arms towards the N. and overran Kiptshak. He then

declared war against India, and in 1398 defeated the Indian army near Delhi. He later came into conflict with Europeans, when he attacked and took Smyrna, the property of the Knights of St John. He died at Otranto on the Jaxartes as he was marching to attack China. His name Tamerlane is a European corruption of Timur-lenk (Timur the Lame). He figures as the hero of Marlowe's (q.v.) great drama, *Tamburlaine*.

Tin, symbol Sn, atomic number 50, atomic weight 118.7, one of the 7 metals of the ancients, occurs as the oxide—tinstone or cassiterite (SnO_2)—and is found in Cornwall and New S. Wales, Australia, but the prin. deposits are in Malaya, the Dutch E. Indies, Bolivia, and Mexico. The metal is prepared from the ore (see **CASSITERITE**) by roasting to remove arsenic and sulphur, followed by heating in a reverberatory furnace with anthracite. The T. so formed is remelted and poles of green wood stirred in it. By this means impurities are carried to the surface in the form of a scum. T. is white and lustrous (sp. gr. 7.2), and melts at 232°C . It is crystalline in structure and when bent emits a curious crackling sound called the 'cry of tin.' T. is not acted upon by the air, and is therefore used for tinning iron (see **TIN-PLATE**). T. readily dissolves in hydrochloric acid with evolution of hydrogen and the formation of stannous chloride (SnCl_2). It is not acted upon by dilute sulphuric acid but dissolves in the concentrated acid. Stannic oxide is formed in the hydrated condition (as in stannic acid $[\text{SnO}_2 \cdot \text{H}_2\text{O}]$) by the action of nitric acid on the metal, while aqua regia acting on the metal forms the tetrachloride (SnCl_4). T. forms 2 series of salts, the stannous, in which it is bivalent, and the stannic salts, in which it is quadrivalent. The stannic salts correspond with similar compounds of carbon and silicon, the oxide (SnO_2) is acidic, and the chloride is a fuming liquid. The stannous salts are strong reducing agents. The oxide (SnO) is basic but also acts as an acid-forming oxide towards strong bases. The alloys of T. are of great value, comprising gunmetal (Cu 88, Sn 10, Zn 2 per cent), bronze (copper and tin), phosphor bronze (0.5 per cent phosphorus), pewter (Sn 80, Pb 20 per cent), modern pewter (Sn, Sb, Cu with a little Bi), solder, bell metal, as well as a large number of alloys with other metals such as gold, iron, bismuth, etc. One of the best-known compounds of T. is pink salt, $\text{SnCl}_2 \cdot 2\text{NH}_4\text{Cl}$, which is used as a mordant in dyeing, and the trisilicate of T. which is used in 'slik-weighting' to replace the sericin in silk when it is degummed.

Tin Can Island, see **NIUAFOOU**.

Tin-plate and Sheet, basis of low-carbon unalloyed mild-steel coated by hot-dipping or electro-deposition with pure tin. It is used chiefly for the manuf. of cans and boxes. See **IRON AND STEEL**; **METALLURGY**.

Tin Tut (d. 1948), Burmese politician, was appointed Vice-Chancellor of Rangoon Univ., 1940, and became adviser for

reconstruction to the Burma Gov. in Exile, 1942-5. He was Member for Finance and Revenue in the Governor's Council. Minister for Foreign Affairs, 1948, he resigned from the Cabinet to become Inspector-General of Auxiliary Forces (Brigadier). He owned and ed. the *New Times* of Burma. He was assassinated in Dec. 1948.

Tinamou, any individual of the Tinamidae, a family of game birds inhabiting the forests of tropical and S. America and placed in a separate order, Tinamiformes. They resemble partridges in appearance, but have little or no tail. However, this resemblance is only superficial, for the T.s have a number of anatomical features in common with the flightless Ratite birds. Although their wings are short, they are able to fly with great speed.

Tinchebray, Fr. tn in the dept of Orne. Here Henry I of England vanquished his brother Robert of Normandy in 1106, after which Normandy was annexed to the Brit. crown. There are hardware and furniture manufs. Pop. 3000.

Tincture, see **HERALDRY**, **Tinctures**.

Tindal, Matthew (c. 1656-1733), deist, b. Bere Ferrers, Devon, and educ. at Lincoln College, Oxford, becoming fellow of All Souls (1678). After having been received into the Catholic Church (1685), he returned to the Church of England (1688), and later wrote controversial pamphlets, which all met with vehement opposition from the High Church party. He aroused very fierce controversy with the pub. of *The Rights of the Christian Church Against all Romish and Other Priests*, 1706. But his famous work was his *Christianity as Old as the Creation*, 1730, popularly known as 'The Deist's Bible,' which had for its purpose the 'stripping of religion of the additions which policy, mistakes and the circumstances of the times, have made to it.' See E. Curll's *Memoirs*, 1734; J. Hunt, *Religious Thought in England*, II, 431 1896.

Tindale, William, see **TYNDALE**.

Tinfoil, see **FOIL**.

Tinned Meat, see **CANNING**.

Tinnevely, or Tirunelveli, tn of Madras State, India, near the S. tip of the subcontinent. It is stated that it was here that St Francis Xavier began his preaching in India. T. has for many years been a particular centre of Christian missions.

Tintagel, coastal vil. and par. of Cornwall, England. The correct name of the vil. proper is Trevena, which merges with Bossiney. T. is a celebrated holiday resort with good bathing beaches. On T. Head, a promontory 300 ft high on the Atlantic coast, are the ruins of a castle, famous in the Arthurian romances. Some affirm that King Arthur was born here and held his court at T. In other versions T. is the impregnable retreat of King Mark. In 1685 a bor. charter was granted to T., Trevena, and Bossiney. Pop. of par., including Trevena and Bossiney, 1552.

Tintern Abbey, famous ruins of Tintern vil. in the co. of Monmouthshire, England, beautifully situated on the Wye, 5 m. N.

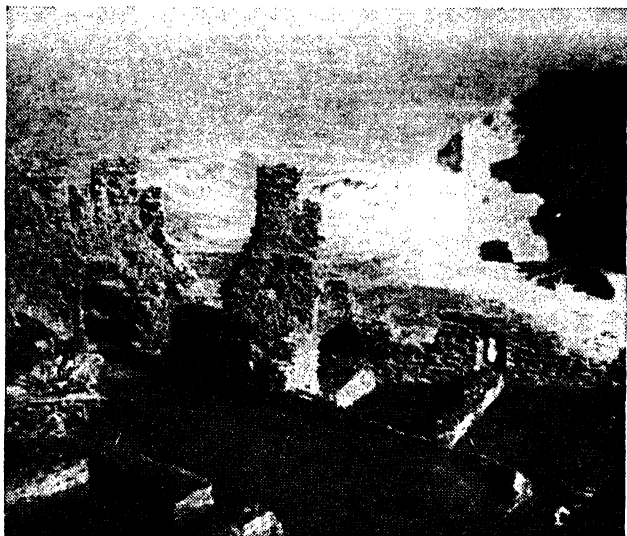
of Chepstow. They date from 1131, when Walter de Clare founded a Cistercian house which became one of the wealthiest foundations in England. The building was mainly erected between 1269 and 1287 by Roger Bigod, Earl of Norfolk. The chief remains are the ruins of the magnificent cruciform church, the chapter house, and refectory, which were purchased by the Crown in 1901.

Tinto, Río, see Río Tinto.

Tintoretto, Jacopo Robusti (1518-94), chief painter of the later Venetian school, b. Venice. He studied under Titian, and was considerably influenced by Michel-

also lives and studies by F. P. Stearns, 1901; E. M. Phillips, 1911; L. Coletti, 1944; H. Tietze, 1949.

Tipperary: 1. Inland co. of the Rep. of Ireland, bounded by Galway and Offaly in the N., Cork and Waterford to the S., Laoighis and Kilkenny to the E., and Clare and Limerick to the W. The co. is one of those supposed to have been made by King John in 1210. It was granted to the Earls of Ormonde in 1328, and was the last of the Irish palatine cos. In 1848 it was the scene of the Young Ireland rising, an abortive rebellion. To the N. and W. lies a mountainous region with Keeper



TINTAGEL CASTLE

Youghlons

angelo, writing on the wall of his studio the precept 'Michelangelo's drawing, Titian's colour.' His paintings show never-failing imagination, broad and dramatic composition, fine draughtsmanship, and a superb use of colour. Where he is most individual is in his rendering of movement in space. His industrious life was spent almost entirely in Venice, and there he painted his great 'Miracle of St Mark, 1548, his decorations for the Scuola di San Rocco (including the vast 'Christ before Pilate' and 'Last Supper') and the 'Paradise' for the Doge's Palace, 1540. The 'St George and the Dragon' (National Gallery) has all his sense of rushing movement, and 'The Origin of the Milky Way' (National Gallery) is one of the most beautiful of painted allegories. Perhaps no writer has shown better appreciation of T. than Ruskin, who rescued him from obscurity (*Stones of Venice*, etc.). See

Hill (2278 ft), and in the S. are the Galtee Mts, with Galtymore (3018 ft), the Knockmaldown Mts. and, farther E., the Slieveardagh Hills. The Bog of Allen adjoins Kilkenny, while in the SW. lies the Golden Vale, one of the most fertile regions in all Ireland. The prin. rivs. are the Shannon in the NW., Little Brosna and Nenagh, and the Suir in the centre, and S. is Lough Derg on the NW. boundary, the only lake of any size. Agriculture is the chief industry; barley and oats are the main crops, and potatoes and turnips are also grown; a considerable area is under pasture, and cattle are reared in large numbers. Dairy farming flourishes, and there are a number of butter factories. There are also flour and meal mills. Coal, copper, lead, and zinc are found, also slate and limestone, and peat and coal mining is being extended. There are many interesting castles and eccles. buildings in

various parts of the co., notably at Cashel, where there is a round tower, at Ardinnan, at Athassel (an Augustinian priory), at Holyroos (Cistercian abbey), and at Fethard and Roscrea (abbeys). Moor Abbey stands at the head of the Glen of Aherlow. The co. is divided into a N. and S. riding, and returns 7 members to the Dail Eireann, 3 representing the N. and 4 the S. The co. tn is Clonmel, and other tns are Tipperary, Carrick-on-Suir, Nenagh, Thurles, Cashel, and Templemore. Area 1658 sq. m.; pop. 137,000, decreased through emigration.

2. Mrkt tn of co. Tipperary, Rep. of Ireland, at the foot of the Slievenamuck Hills. In the fertile plain known as the Golden Vale, it is famous for its butter making, and there are also condensed- and powdered-milk factories, and lino and glove manufs. 4 m. from the tn is the Glen of Aherlow, and just outside the tn is New T., the vil. built by Wm O'Brien in 1890 for the Smith-Barry tenants who had to give up their holdings on account of the boycott. Charles Kickham, the patriot poet and novelist, was b. in T. Pop. 5200.

Tippett, Michael (1905-), composer, b. London, studied at the Royal College of Music and in 1934 came forward with a Symphony in B flat major, now superseded by two others, 'Nos. 1-2,' 1945 and 1958. A choral work of 1937, *A Song of Liberty* (Blake), expressed his humanitarian views, and even more so did the indignant war-time oratorio, *A Child of our Time*, 1941. T. is a very deliberate composer and also highly self-critical, so that further works appeared in slow succession, but always showed closely concentrated craftsmanship and great originality. He owes nothing to current systems, much less to fashions, but his work is distinctly modern in a very personal way. It includes a Concerto for double string orchestra, a Fantasy on a Theme by Handel, and a Concerto for piano and orchestra, 3 string quartets, a Fantasy Sonata for piano, and 2 sets of songs, *Boyhood's End* (W. H. Hudson) and *The Heart's Assurance*. An opera with a libretto of his own, *The Midsummer Marriage*, was produced in London, at Covent Garden, in 1955.

Tippoo Sultan, see **Tipu**.

Tiptstaff, officer of the High Court whose function it is to arrest within the precincts of the Court and take to prison any person committed by the Court. The name is often extended to any constable, sheriff's officer, and court crier or usher, and is connected with the staff tipped with metal or a small crown which was formerly his badge of office.

Tipton, tn of Staffordshire, England, engaged in light and heavy engineering, iron founding, and the manuf. of motor-car parts, grates, furniture, glassware, hollow-ware, clothing, light metal goods, electrical equipment, machine tools, etc. Its par. registers, beginning in 1513, are the oldest in England. Pop. 39,300.

Tiptree, vil. in Essex, England, 46 m. from London on a light railway running from Kelvedon. It is noted for fruit and seed growing, and for its jam factory. Pop. 2453.

Tipu, or **Tippoo Sultan** (1749-99), son of Hyder Ali, succeeded his father as Sultan of Mysore in 1782. He had previously distinguished himself in the Mahratta war, 1775-9, and in the first Mysore war had defeated Braithwaite in 1782. As sultan he concluded a treaty with the British in 1784, but in spite of this invaded (1789) the protected state of Travancore. War followed, and in 1792 he was obliged to resign half of his dominions. But nothing daunted, he continued his intrigues, urging the French to stir up war with England, the result of which was the storming of his cap., Seringapatam, by the English, during which T. himself was killed. See L. B. Bowring, *Haidar Ali and Tipu Sultan*, 1893.

Tipulidae, see **CRANE FLY**.

Tiraboschi, Girolamo (1731-94), It. scholar, b. Bergamo. He was a Jesuit and prof. of rhetoric in the univ. of Milan, 1755. Here he wrote *Vetera Humiliatorum Monumenta*, 1766. In 1770 he was appointed librarian to the Duke of Modena, and completed his masterpiece, *Storia della Letteratura Italiana* (13 vols.), 1772-82.

Tirana, cap. of Albania, 20 m. inland above the Rushka valley. It dates from the 17th cent., when Albania was part of the Turkish dominions, and is noted for its mosques. The tn was much damaged during the Second World War, but was afterwards rebuilt and greatly expanded to become the administrative, educational, and industrial centre of the new Communist-controlled Albania. Pop. (1955) 110,300.

Tiree, is. of the Inner Hebrides, off Argyll, Scotland. Hynish in the S. has a watch tower built for signalling to men on duty at Skerryvore lighthouse. The surface is flat, and has been used as a landing-ground for aircraft. Pop. 1200.

Tiresias, blind Theban seer, said to have been deprived of his sight by Athena, whom he saw bathing, but afterwards endowed by her, in pity, with gifts of prophecy. He counselled Oedipus and Creon, and Odysseus descended into Hades to consult him.

Tirgoviste, or **Tergoviste**, tn in the prov. of Ploesti, Rumania, 44 m. NW. of Bucharest. There is a 16th-cent. Gk Orthodox church and ruins of a 14th-cent. castle. It is a garrison tn, with a cavalry school and an arsenal. From 1383 to 1698 T. was cap. of Wallachia. Pop. (1930) 22,300.

Tirgu Mures (formerly **Mures-Osorheiu**, Hungarian, **Maros-Vasárhely**, Ger., **Neudorf**), cap. of the Magyar Autonomous Region, 50 m. ESE. of Cluj, Transylvania, Rumania, on the l. b. of the Mures. There is an old fortress with a Gothic church, and a palace with a library of 70,000 vols. Sugar, textiles, leather, spirits, and furniture are made, and there is a trade in grain and wool. Pop. (1948) 47,000.

Tiridates, name of a dynasty of Parthian or Armenian kings, 5 of whom are remembered. The 2 most important are Tiridates I and II. *Tiridates I* conquered Armenia with the assistance of his

brother, Vologeses I of Parthia. In AD 63 he was obliged by the victories of Corbulo to abdicate and accept his crown anew at the hands of Nero. *Tiridates II*, who had been educ. at Rome, was placed on the throne of Armenia by Diocletian in 286. He was constantly at war with the Persians, and d. a Christian in 314.

Tirlemont, see TIENEN.

Tiro, Marcus Tullius, freedman of Cicero, and his amanuensis and assistant in literary labours. He was himself an author of no mean reputation, and notices of his works have been preserved by ancient writers. He was the first recorded person to invent a system of Lat. shorthand.

Tirol, or Tyrol: 1. Former crown land of Austria-Hungary, in the Alps. In Rom. times it was inhabited by the Rhaetians (see RHAETIA). It was later ruled by the Bishops of Brixen and Trent (q.v.), and came into the possession of the house of Hapsburg (q.v.) in 1363. It was ceded to Bavaria (q.v.) in 1805 (see also HOFER, ANDREAS), but was returned to Austria by the Congress of Vienna (q.v.) in 1814. By the treaty of St Germain-en-Laye (q.v.) in 1919, T. was divided, the part N. of the Brenner Pass (q.v.) becoming a prov. of the new Austrian rep. (see 2, below), and the part S. of the Pass being ceded to Italy. It. T.—the Trentino (q.v.) and the upper Adige (q.v.)—was the subject of bitter contention between Austria and Italy, 1919–39. (For the hist. of this question, see *under AUSTRIA*.) After the Second World War the Council of Foreign Ministers, meeting in Paris, decided, despite Austrian demands to the contrary, that S. T. should remain It. Italy and Austria were encouraged to make a separate agreement relating to the region, and this was incorporated into the It. Peace Treaty of 1947. Under the agreement, Ger.- and It.-speaking people have equal rights, the region has a degree of legislative and administrative autonomy, and steps are to be taken to facilitate intercourse between Austrian and It. T. See M. Steinitzer, *Das Land Tirol*, Vienna, 1923; Foreign Office Historical Section, *The Trentino and Alto Adige*, 1920.

2. Prov. of W. Austria, the N. half of the former crown land of T. (see 1, above). It is bounded on the N. by Bavaria, and on the S. by Italy. E. T., the part S. of the Hohe Tauern, is detached from the rest of the prov. The main part of the prov. contains the great valley of the Inn, and the valley of the Lech—both running NE.–SW. The Alpine chains separating these valleys are broken up by many tribs. running N.–S. Grossglockner (12,460 ft.), the highest peak in Austria, is at the junction of the borders of E. T., Salzburg, and Styria. The valley of the Drau crosses E. T. E.–W. The prov. is heavily forested. The chief occupations are dairy-farming, stock-raising, and forestry. Lignite, nickel, lead, and other minerals are found, there are textile and chemical manufs., and there are sev. hydro-electric installations. The cap. is Innsbruck (q.v.). Area 4884 sq. m.; pop. 427,450.

Tirpitz, Alfred Peter Friedrich von (1849–1930), Ger. grand-adm.; b. Küstrin, son of one 'Gross-Justiz-Rat' T., of a Prussian landowning family. Attended the Realschule at Frankfurt-on-the-Main. Passed into the Prussian Navy in 1865, and for 30 years was almost continuously at sea. In the 1870s T., a lieutenant-commander, prepared memoranda on torpedoedoes, which led to the estab. of a torpedo-section in 1885. In 1892 he was appointed to the naval staff at Berlin. Rear-adm., 1895, in 1896, he was appointed to command the Asiatic Cruiser Squadron; under his direction Tsingtao became a Ger. naval base. On returning home in 1897 he became secretary of state for the Navy. In 1898 he presented to the Reichstag his first Navy Bill, the beginning of the serious growth of the Ger. Navy. Vice-adm., 1899. His second Bill was brought in in 1900; it definitely started the naval armament 'race.' Adm., 1903. Grand-adm., 1911. At the beginning of the First World War he was still secretary of state for the Navy; but he was on bad terms with his 2 naval colleagues, and did not succeed in his purpose of making full use of the Navy from the beginning. He resigned 15 Mar. 1916, and was Nationalist member of the Reichstag from 1924 to 1928, and then retired to private life. He wrote *My Memoirs*, 1919, also *Der Aufbau der deutschen Weltmacht*, 1924.

'Tirpitz,' Ger. battleship, see NAVAL OPERATIONS IN SECOND WORLD WAR.

Tirso de Molina (pseudonym of Gabriel Tellez) (c. 1584–1648), Sp. dramatist, b. Madrid, educ. at the univ. of Alcalá. When he had taken his degree he left for Madrid, in order to take up the life of a dramatist. He was a very prolific writer, and wrote 300 comedies till 1625 when he ceased to write plays. He is perhaps the most forceful of Sp. dramatists, and his characters, portrayed in action, are often extreme and unusual. His best-known play is *El Burlador de Sevilla*, introducing the figure of Don Juan. He also excelled in historical plays, as *La Prudencia en la Mujer*, and biblical dramas, as *La Venganza de Tamar*. Tellez ended his life as a member of a religious order, and became prior of the monastery of Soria, where he d. See life by A. H. Bushee, 1939; I. L. McClelland, *Tirso de Molina. Studies in Dramatic Realism*, 1948.

Tiryns, ancient city of Argolis, traditionally founded by Proetus, who was said to have built the walls with the aid of the Cyclopes. T. existed in the 3rd millennium BC; its earliest fortifications were erected about 1000 years later, and were rebuilt at least twice. The city was finally destroyed by the people of Argos in 468 BC. Excavations made between 1884 and 1927 have revealed many interesting structures, including the remains of 2 palaces dating from about 1600 BC. See AEGEAN CIVILISATION.

Tisa, see TISZA.

Tischendorf, Lohse Gott Friedrich Konstantin von (1815–74), Ger. biblical scholar, b. Legenfeld in Saxony. He made a special study of N.T. criticism at

the univ. of Leipzig, and in 1845 became prof. there. He discovered the 4th-cent. Sinaitic Codex (see SINAITICUS, CODEX), at the monastery on Mt Sinai. His works include eds. of the Sinaitic Codex, 1862-3, *Editio VIII* of the New Testament, 1864-72, the *Monumenta Sacra Inedita*, 1846-71, and *Reise in den Orient*, 1846, and *Aus dem Heiligen Lande*, 1862, which describe his journeys.

Tiselius, Arne Wilhelm Kaurin, (b. 1902). Swedish biochemist, b. Stockholm. In 1931 he took a D.Phil. at Uppsala, where he worked on chemistry, electrophoretic work, and absorption analysis and made discoveries on the nature of serum proteins. He was elected in 1943 to the New York academy of sciences, and received the Nobel prize for chemistry in 1948.

Tisio da Garofalo, see GAROFALO.

Tisiphone, see EUMENIDES.

Tiari, seventh month of the anct Biblical (the name T. is post-biblical) calendar, and first month of the Jewish post-exilic calendar, corresponding to Sept.-Oct. On the first day is the feast of the New Year (Rosh Hashanah, q.v.); on the tenth the Day of Atonement (Yom ha-Kippurim, q.v.); on the fifteenth the harvest festival or feast of Tabernacles.

Tissa, see TISZA.

Tissaphernes, Persian soldier and statesman, the son of Hydarnes. He was satrap of Lower Asia in 414 BC, and during the Peloponnesian War espoused the cause of Sparta, though without giving any assistance. His plans being thwarted by Cyrus, who helped the Spartans, he repaired to the King, Artaxerxes II, warning him against his brother and took part in the battle of Cunaxa. At that battle he was one of the 4 gens. who commanded the army of Artaxerxes, and his troops were the only portion of the left wing that was not put to flight by the Greeks. When the Ten Thousand had begun their retreat, T. promised to conduct them home in safety; but during the march he treacherously arrested Clearchus and 4 of the other gens. As a reward for his services, he was invested by the king, in addition to his own satrapy (Lydia and Caria), with all the authority which Cyrus had enjoyed in Asia. This led to a war with Sparta, T. being defeated by Agesilaus near Sardis, on which account, as well as by the influence of Parysatis, the mother of Cyrus, he was put to death (395) by order of the king.

Tisserand, François-Félix (1845-96). Fr. astronomer, b. Nuits-Saint-Georges, Côte-d'Or, was appointed as *astronome adjoint* to the Paris Observatory in 1863 and as director in 1892. In *Bulletin Astronomique*, 1899, he dealt with the theory of the capture of comets by the larger planets and pub. his well-known *Criterion* for establishing the identity of a periodic comet, in spite of its perturbations by the planets. This also appeared in his chief work, *Traité de Mécanique céleste*, and is expressed as follows: $\frac{1}{a} + 2\sqrt{a(1-e^2)}$

$\cos i$ is constant, where a is the semi-major axis of the ellipse in which the

comet moves, e its eccentricity, and i the inclination of its orbit to the plane of the ecliptic.

Tissington, vill. and par. of Derbyshire, England, 8 m. WSW. of Wirksworth, noted for the well-dressing ceremonies carried out on Ascension Day, when 5 wells, which were of benefit to the inhab. during the Black Death, are decorated with pictures made from flower petals, leaves, and mosses set in damp clay, and visited in procession as a thanksgiving. Pop. 250.

Tissot, James Joseph Jacques (1836-1902), Fr. painter, b. Nantes. He settled in England after 1870, and did illustrations for London journals. He also illustrated the life of Christ, but is better known by charming and detailed pictures of late-Victorian life, an example being 'The Picnic' (Tate Gallery).

Tissue and Tissue Culture. T. (Lat. *texere*, to weave) in general usage denotes either an interwoven fabric, or a connected series of statements, circumstances, or events. Biologically, a T. consists of associated cells having in common either form, function, both form and function, or other characteristics. In animals there is frequently dead, non-cellular matrix deposited between the cells, as for instance in bone and cartilage. The study of T.s is *histology*. T.s may be named severally according to the types of cells composing them, e.g. muscular and nervous T.s of animals, and parenchymatous, prosenchymatous, and sclerenchymatous T.s of plants; or according to their function, e.g. connective T.s of animals, vascular and storage T.s of plants; or according to their position, e.g. epithelial tissue of animals and dermal T.s, such as cork and bark, of plants. See also AMOEBA; CELL; EMBRYOLOGY; EPITHELIUM; EXPERIMENTAL EMBRYOLOGY; HISTOLOGY; LYMPH AND LYMPHATICS. See G. R. De Beer, *Experimental Embryology* (2nd ed.), 1943; T. S. R. Strangeways, *Tissue Culture in Relation to Growth and Differentiation*, and *The Technique of Tissue Culture 'in Vitro'*.

Tissue Paper, see PAPER.

Tisza (Ger. *Theiss*; Russian *Tissa*; Serbo-Croat. *Tisa*), riv. of the Ukraine, Hungary, and Yugoslavia. It rises in 2 head streams in the Carpathians (q.v.), in Ruthenia (q.v.), and flows W.-SW.-S. across the Alföld (q.v.), generally parallel with the Danube (q.v.), which it joins at Novi Sad (q.v.). In its lower reaches in Yugoslavia it is also connected with the Danube by canal. At Tiszalök, S. of Tokaj (q.v.), there is an important hydroelectric station (1953) and a scheme for irrigating part of the Hortobágy puszta (q.v.). The prin. tribs. are the Körös and the Mureş (qq.v.). Length 840 m.

Tisza of Boros-Jenő and Szeged, Istyvan (Stephan) Emmerich Ludwig Paul, Count 1861-1918), Hungarian statesman, b. Budapest, son of Kálmán Tisza, a former liberal Prime Minister of Hungary. He was Prime Minister from 1903 to 1905 and again from 1913. He was adamant in his attitude to minority peoples within

the ters. of the Dual Monarchy, so that he hopelessly estranged Rumanian feeling. On the death of the Emperor Francis-Joseph, 1916, T.'s influence began to wane. The Emperor Charles favoured a thorough review of the problem of the Slav. pops., and also a democratisation of the franchise. T. objected to both these reforms, resigned May 1917, and was assassinated in the following year.

Tiszalök, see **TISZA**.

Tit, or **Titmouse**, names given to members of the passerine family *Paridae*. Five species, all great insect-eaters, are common in Britain, and 2 occur in a few dists.: one of these is the bearded T. or reed pheasant (*Panurus biarmicus*), which is found only in Norfolk and Yorks; the male is about 6 in. long, and has a thin tuft of black feathers on each side of the chin; the general colour is light red. The crested T. (*Parus cristatus*) occurs only in parts of Scotland, though it sometimes visits England. The blue T. (*P. caeruleus*) is the commonest of these birds; its prevailing colour is blue, with green above, and a black throat. The coal T. (*P. ater*) has a black head, with a white patch on the nape. The great T. (*P. major*) is about 6 in. long and is yellow on the back, breast and sides, with grey wings and tail, and black head and throat. The marsh T. (*Penthestes palustris*) resembles the coal T. except for the latter's white nape and white spots on the wings. The long-tailed T. (*Aegithalos caudatus*) is about 5½ in. long, and has the black tail feathers prolonged and graduated. The black-cap T. or chickadee (q.v.) (*P. atricapillus*) is a N. Amer. native.

Tit-lark, see **PIPETT**.

Titan, satellite of Saturn (q.v.). Mean distance from primary 759,500 m., period of time, 15 days, 22 hrs, 4 min. Stellar magnitude 8.3.

Titania, see **MAR, QUEEN**.

Titania, satellite of Uranus (q.v.). Mean distance from primary 272,500 m., period of revolution 8 days, 16 hrs, 56 min, stellar magnitude 13.7.

'**Titanic**' Disaster was caused by the White Star liner *Titanic* colliding with an iceberg on the night of 14 April 1912. In all, some 1500 persons were drowned, among them being Colonel J. J. Astor, Jacques Futrelle, the Amer. novelist and dramatist, F. D. Millet, the artist, William T. Stead, editor and journalist, and Harry Widener, millionaire book-collector. Out of 2206 passengers, only 703 were saved, being picked up by the *Carpathia* after a wireless message from the *T.* The *T.*, then the largest vessel afloat (tonnage about 45,000), was on her maiden voyage to New York, and at 11.46 p.m. ship's time (10.13 p.m. New York time) of the fifth day of the trip, when in lat. 41° 46' N., and long. 50° 14' W., struck an enormous iceberg a glancing blow, stripping off her bilge practically from end to end. Less than 3 hrs from the impact the liner sank. After an inquiry the Mersey Report was issued, as a result of which improvements were introduced in life-saving equipment, and boat-drill for passengers became a necessary

routine. See L. H. Beesley, *The Sinking of the Titanic*, 1912; W. Lord, *A Night to Remember*, 1956.

Titanium, metallic chemical element, symbol **Ti**, atomic weight 47.9, atomic number 22. It is a white, lustrous metal of low density (sp. gr. 4.5) and high strength, which is resistant to atmospheric corrosion. It has only recently become commercially useful, and because of its high cost it is used almost exclusively in aircraft manufacture. T. ranks ninth in abundance amongst the elements in the earth's crust, but owing to its reactivity at high temperatures its extraction from its ores, anatase, ilmenite, rutile, brookite, and aeschinite, is particularly difficult. The element was first discovered in England by Gregor in 1790, but did not receive its name until Klaproth found it in Hungary in 1795 and named it after the mythological first sons of the earth, the Titans. Neither Gregor nor Klaproth succeeded in isolating elemental T. but isolated its oxide. It was in 1910 that Hunter succeeded in preparing the metal by the reduction of T. tetrachloride with sodium in a sealed steel vessel. It was not until 1946, however, that Kroll first produced the metal on a pilot-plant scale by reducing the tetrachloride with magnesium; this method is now being generally used commercially, although sodium is sometimes used instead of magnesium. The E. I. du Pont de Nemours and Company became the first producers of metallic T. for general sale in 1948. Since the molten metal (melting point 1690° C.) reacts with every known refractory sufficiently to produce serious contamination, special methods have had to be devised to melt and cast the pure metal. To overcome contamination a water-cooled metal crucible, usually copper, is used. The charge of T. sponge obtained by the magnesium reduction of the tetrachloride is melted by a direct-current arc in an inert atmosphere of argon or helium. Additional sponge or T. scrap is added and an ingot is built up layer by layer. The electrode assembly of tungsten is also water cooled. The metal does not wet or react with the water-cooled metal crucible. Continuous operation is maintained by slowly lowering the base of the crucible. Round ingots weighing 4000 lb. have been produced by this method.

Titanotheres, extinct perissodactyl mammals which lived in Eocene and early Oligocene times. They were of considerable size, and had large horn-like processes on the front of the skull. The teeth were primitive, and they probably lived on soft vegetation.

Titans, the 6 sons and 6 daughters of Uranus and Gaea, who overthrew their father, at their mother's instigation, and made the youngest of them, Cronus (q.v.), king in his place. He was in turn overthrown by his youngest son, Zeus (q.v.). He obtained from Thetis an emetic that made Cronus vomit up his brothers. The better Titans now fought for the Olympians against the rest. At Hera's advice the Cyclopes and the Hecatoncheires

(hundred-handed monsters) were released from Tartarus, and helped to hurl the rebels to Tartarus, where the Hecatoncheires kept guard over them.

Titchener, Edward Bradford (1867-1927), experimental psychologist, b. Chichester. He graduated at Oxford (1890) and studied at Leipzig (Ph.D., 1892), where he became an ardent admirer of W. Wundt (q.v.). Proceeding to Cornell Univ., U.S.A., where one of the first experimental psychological laboratories had been founded, he remained there for the rest of his life and became recognised as a world authority on his subject. His *Experimental Psychology, a Manual of Laboratory Practice* (2 vols.), 1927, is the masterpiece on the subject so far as Eng.-speaking people are concerned; in this exhaustive treatise he considered both qualitative and quantitative experimental work. He also wrote *Psychology of Feeling and Attention*, 1908, and *Experimental Psychology of the Thought Processes*, 1909. The *Titchener Commemorative Volume*, 1917, includes a bibliography of his writings; biography by C. S. Myers in *Brit. Journal of Psychology*, vol. 18, 1928.

Tite, Sir William, M.P., F.R.S. (1798-1873), architect, b. London. In 1824 he won competitions for the Presbyterian Church, Regent Square, and for the new buildings of Mill Hill School; and in 1840 for the Royal Exchange, London. He also built many railway stations in England and France, and had a large practice. As M.P. for Bath he took a prominent part in debates about the projected Gov. Offices in Whitehall, 1855-72. He was President R.I.B.A. 1861-3 and 1867-70; and was awarded the R.I.B.A. Royal Gold Medal in 1856.

Tithe. T.s were 'tenth part of the increase yearly arising from the profits of lands, stocks upon lands, and the industry of the parishioners, payable for the maintenance of the par. priest, by everyone who has things titheable, if he cannot show a special exemption' (Thomas Wood's *Institute of the Laws of England*). T.s were payable before the Christian era (see Gen. xiv. 20), but in the Christian Church T.s were first given by the faithful as spontaneous offerings given in kind, e.g. wool, corn, or other agric. or farm produce. Canon law (q.v.) later enjoined payment as a legal obligation in accordance with the divine law of the O.T. (see TREINDS). T.s were either *praedial*, *personal*, or *mixed*: *praedial* being the produce of the soil (e.g. corn, wood); *personal*, the produce of labour and industry; and *mixed*, the produce of animals, also including eggs. Before the Lateran Council (1215), it was a common practice to pay T. to monasteries, but the Council restricted T. payment to the parsons of parrs. In consequence most T.s belonged as of common right to the par. incumbents, though sometimes laymen could show a right to a portion of T.s based upon a prior voluntary grant to some spiritual corporation. Again, rectorial T.s, after the dissolution of the monasteries, frequently found their way into lay hands

(see IMPROPRIATION). The only lands exempt from T.s were barren heath, waste forest or glebe, old monastic lands held prior to the dissolution exempt from T.s, crown lands or lands held by a spiritual corporation, which had never been known to pay T.s, and lands in respect of which was payable a modus or composition real, an agreement between parson ordinary and landowners and patron, whereby the landowners agreed to pay a perpetual sum in lieu of T. The Tithe Commutation Act, 1836, and amending Acts commuted all the T.s of England and Wales into T. rentcharge and fixed the total amount of the rentcharge for which the T.s of each par. were to be commuted.

Provision was made by the Tithe Act, 1918, for the compulsory redemption of rent charges exceeding 20s., the consideration money for redemption being the amount agreed between the owners of the land and of the rentcharge. Provision for apportionment of annuities created by the redemption of T. rentcharge was made by an Act passed in 1921. The Tithe Act, 1925, still further amended the law on T. rentcharges, rents, etc., in lieu of T., and the payment of rates on rentcharge, etc. By this Act any T. rentcharge which before 31 Mar. 1927 was attached to a benefice or to an eccles. corporation was transferred to be vested in the Governors of Queen Anne's Bounty and held in trust for the incumbent or corporation.

Notwithstanding much legislation, rentcharge gave rise to agitation and remained a vexed question which was settled only by another Act, the T. Act of 1936, which at last ended a system containing ineradicable difficulties. This Act extinguishes both rentcharge and extraordinary rentcharge, and makes provision through a Tithe Redemption Commission for compulsory redemption and for the compensation of persons interested, by the issue of 'redemption stock' charged on the Consolidated Fund. In other words, the rentcharge, previously payable to the Church, the Eccles. Commissioners, Queen Anne's Bounty, and some lay owners, is replaced by 'redemption annuities' payable to the Crown, and the Crown issued gov. stock to the tithe-owners. Thus for the first time in its long hist. T. was divorced from the Church. The annuities will be payable until 1996, when they should cease and all T. (with a few minor exceptions, such as corn rent) will be abolished. A capital loss estimated at £17,750,000 resulted to the Church of England from the Act of 1936, a situation which called for every possible adjustment by the Eccles. Commissioners and Queen Anne's Bounty (now amalgamated as the Church Commissioners). See P. W. Millard, *Tithes and Variable Rentcharges: Some Aspects of their History and Development*, 1934, and *Law Relating to Tithes and Payments in lieu of Tithe* (3rd ed.), 1938.

Tithing: 1. A tithe (q.v.).

2. An association of 10 men in the arrangement known as frankpledge (q.v.); now still sometimes found applied to a div. of an Eng. co., one-tenth of a hundred (q.v.).

3. A tenth part.

Tithonus, in Gk mythology, son of Laomedon, brother of Priam, loved for his beauty by Eos, who secured from Zeus for him the gift of immortality. Not, however, having eternal youth, he grew hideously old, and Eos turned him into a grasshopper.

Titian, or **Tiziano Vecelli** (c. 1477-1576), It. painter of the Venetian school, *b. Pieve*, in Cadore, a mountainous dist. of the Venetian Alps. Having shown a taste for art, he was sent to Venice to learn painting, and first studied under Zuccati, a mosaicist, afterwards becoming the pupil of Giovanni Bellini and working with Giorgione (q.v.). He seems first to have been employed in the decoration of houses, but he also produced works on canvas, notably the allegorical picture 'Sacred and Profane Love' (Borghese Gallery), 'Doge Marcello' (at the Vatican), and 'Christ and the Tribute Money,' of the Dresden Gallery, spoken of by Vasari as something stupendous and miraculous. In 1516 he was made official painter to the council in Venice. In the same year he went to Ferrara, and executed amongst other works the glorious masterpiece 'Bacchus and Ariadne,' now in the National Gallery. In 1533 he became acquainted with the Emperor Charles V, who sat to T. for his portrait, rewarding him by making him a Count Palatine and a Knight of the Golden Spur. He was now of European eminence. Returning from Bologna to Venice (1537), he executed his magnificent 'Battle of Cadore,' which unfortunately perished by fire in 1577, but he was again with the emperor at Milan in 1541, and in 1545 accepted the Pope's invitation to Rome, where he painted portraits, as well as 'Danaë,' now in the Naples Museum. In 1548 he undertook a journey across the Alps to join Charles V at Augsburg, and painted the well-known portraits of Philip of Spain. From this time he was chiefly occupied in working at Venice, until in 1576 he died of the plague. T.'s works are remarkable for their magnificent colouring and technical skill. He painted religious pictures as well as mythological, poetical, and allegorical subjects, and as a portrait painter he occupies the first rank. See J. A. Crowe and G. B. Cavalcaselle, *Life and Times of Titian*, 1887; C. Phillips, *Titian: a Study of his Life and Work*, 1898; C. Ricketts, *Titian*, 1910; D. von Hadeln, *The Drawings of Titian*, 1927; R. F. Heath, *Titian*, 1930; H. Tietzo, *Titian*, 1936; D. Cecchi, *Titian* (trans. N. Wydenbruck), 1957.

Titicaca, Lake, mt lake in the Andes, on the frontier of Bolivia and Peru, in S. America, between the main Andean range and the Cordillera Real. It is 110 m. long, has an average width of 30 m., and lies 12,507 ft above the sea. It consists of the 2 lakes Chucuito and Uinamarca, connected by the Strait of Tiquina. An important steamer service connects Puno in Peru with Guaqui in Bolivia. Its area is 3200 sq. m., and its maximum depth is about 700 ft. The water is fresh though unpleasant for drinking, and provides valuable fisheries.

Title Deeds, documents showing a person's right to interests in land (e.g. conveyance, lease, mortgage).

Titles, additions to a person's name, indicative of some honour, office, or dignity, e.g. emperor, prince, chancellor, primate, duke, mayor. Some T. are held *virtute officii*, as for instance 'king'; others, like the T. of the 5 orders of nobility, and baronets in Britain, are hereditary, and some, like that of knight, are conferred for life. See also ADDRESS, FORMS OF; NAMES; NOBILITY; ORDERS OF KNIGHTHOOD.

Titmouse, see BLACK-CAPPED TOMTIT.

Tito, Josip Broz (1890-), Yugoslav soldier and statesman, *b. Kumrovec* near Zagreb. He came of peasant stock, and worked as a farm-labourer for a time. After the First World War he became a Communist, paying frequent visits to Moscow for training periods there and adjustment to the ever-changing Party line. In the winter of 1928-9 he was arrested in Zagreb. After a short time



Yugoslav Embassy

PRESIDENT TITO

in the Zagreb prison T. returned to Moscow and attended the Lenin school for 2 years. In 1934 he became a member of the Yugoslav Politburo, and here he began his secret struggle to oust Stalin's satellite, Milan Gorkić, who had been sent to Belgrade in 1928 to bind the Yugoslav Party to the Soviet general secretariat. After 3 years of conspiracy T. achieved his first success; Gorkić paid the usual price of failure, was called to Moscow in 1937, and executed. Installed with unlimited power, as the general secretary of

the Yugoslav Party, T. dissolved it and ordered a re-registration. Surrounded by loyal adherents, T. now began to aspire to higher things. Unlike most of the other Communist leaders of Europe, who remained safely in Moscow during the War, T. was in his own country organising resistance to the Nazis. His fight was fraught with the greatest difficulties, for his antagonists included, besides the Nazis, the Mihalovich (q.v.) partisans and the N.K.V.D. observers in his own Politburo. By welding the peasants into a victorious guerilla partisan army he felt he had contributed not only a new Communist experience but something novel in Stalinist doctrine. In mid-1948 the Cominform expelled T. and urged the Yugoslav people to turn him out of office if he did not change his policy. Yet a year later T. was still in power in spite of all that the Cominform had been able to do, though there can be no doubt that the quarrel with Soviet Russia had by that time made serious political and economic difficulties for Yugoslavia; but equally there seems to be no doubt that T. was still genuinely popular with supporters from all classes of the people and all parts of the country; for the idea that Moscow should try to control Yugoslav internal affairs, or limit her industrial expansion, roused their national pride and rallied many Yugoslavs hitherto hostile to his gov. round T. As a consequence of this quarrel the Cominform countries decided to impose economic sanctions, and therefore stopped sending to Yugoslavia any cap. equipment, hoping that unemployment and food shortage would eventually bring about wholesale collapse of Yugoslav economy; but T., adhering to his five-year-plan, made trade treaties with over a score of countries, many of them in W. Europe and received economic aid from Britain, France, and the U.S.A. In 1953 T. paid a State visit to Britain. After Stalin's death he resumed relations with U.S.S.R., though maintaining his country's independence of the Soviet bloc. In 1956 T. visited Moscow, and it seemed that the Yugoslav connection with Russia might be about to become much closer. But after the events of autumn 1956 in Poland and Hungary this possibility appeared less likely. When the Yugoslav constitution was revised in 1953 T. became President, being re-elected in 1954. He is also supreme commander of the Yugoslav armed forces. See also under EASTERN FRONT in SECOND WORLD WAR. See G. Bilainkin, *Tito*, 1949; F. Maclean, *Eastern Approaches*, 1949; H. F. Armstrong, *Tito and Goliath*, 1951; V. Dedijer, *Tito Speaks*, 1953; F. Maclean, *Disputed Barricade*, 1957; E. Halperin, *The Triumphant Heretic*, 1957.

Titograd (formerly *Podgorica*, or *Podgoritz*; anct. *Ribnica*), tn in Yugoslavia, the cap. of the rep. of Montenegro. It is at the confluence of the Ribnica and Morača. It was seriously damaged in the Second World War, but has been rebuilt as a fine, modern city, and its commercial and industrial importance is

growing. Diocletian (q.v.) was b. at Dioclea, near by. Pop. 16,350.

Titration, method in quantitative chemical analysis. The weight of a substance in a definite volume of solution is determined by causing it to react with a solution of another reagent of known strength. This reagent is contained in a burette and run out into the other solution till reaction is complete, as shown by change of colour of an indicator such as litmus, methyl-orange, phenolphthalein, or by cessation of effervescence, etc. The volume used is noted, and the weight of reagent contained is thus known. From the chemical equation and the atomic weights, the weight of the other solute can then be calculated. T. methods are quick and, under suitable conditions, are susceptible of great accuracy; they have therefore largely displaced the older gravimetric methods, though these are still employed when even greater accuracy is required. T. was introduced by Gay-Lussac (q.v.) early in the 19th cent.

Titulescu, Nicolas (1883-1941), Rumanian lawyer and statesman, became prof. of law at Jassy Univ. (1905) and at Bucharest Univ. (1909). He entered Parliament in 1913 as a supporter of Také Ionescu (q.v.) and a recognised authority on finance. In the First World War he was finance minister from 1917 until the treaty of Bucharest, when he resigned. In his term of office he supported the scheme of land reform involving div. of the large estates, whereby he probably saved his country from Bolshevism. He took a prominent part in negotiating the agreements with Czechoslovakia and Yugoslavia which constituted the Little Entente (q.v.). He was twice ambassador in London. As delegate to the League of Nations, he was president of the Assembly in 1930-1. His policy of a Balkan bloc led to the signing of the Balkan Pact of Feb. 1934. His foreign policy envisaged friendship with France, accommodation with Russia, and regional pacts in the Balkans, the objective always being the integrity of Greater Rumania. In 1936 he was ousted from the gov., left Rumania, and lived in London and Monaco.

Titus, St. friend and companion of St Paul who consecrated him Bishop of Crete. All we know of him is learned from the canonical epistle addressed to him by St Paul. Eusebius says that T. remained unmarried and d. in old age. His feast is on 4 Jan. See B. S. Easlon, *The Pastoral Epistles*, 1948.

Titus (T. Flavius Sabinus Vespasianus) (AD 39-81), Rom. emperor, son of Vespasian. He served when a young man as military tribune in Britain and Germany, and helped to crush a Jewish insurrection (67), besieging and storming Jerusalem (69-70). T. was associated with Vespasian in the gov. (71), and succeeded him (79), proving a wise and kind ruler. Under T. began the campaigns of Agricola in Britain. Two heavy calamities fell upon Italy during his reign: the eruption of Vesuvius, burying Pompeii, Herculaneum, and Stabiae (24 Aug. 79), and,

a few months later a great fire in Rome. T. completed the Colosseum and erected the baths which were called after him. See Suetonius, *Titus*; Tacitus, *Historiae*; Josephus, *History of the Jewish War*; C. E. Beulé, *Titus et sa Dynastie*, 1872.

Tityus, giant of Euboea, son of Gaea, or of Zeus and Elara. For offering violence to Artemis (or to Leto) he was killed by Zeus (or Apollo) and cast into Tartarus, where 2 vultures perpetually devoured his liver while he lay prone on the ground.

Tiumen, see TYUMEN'.

Tiv, or **Munshi**, an important pagan tribe, numbering 800,000, of Central Nigeria. They are cultivators, with a complex clan system devoid of any centralised political authority. Formerly they practised marriage by sister-exchange. Their religion is based upon the belief in fetishes (*akombo*). See L. and P. Bohannan, *The Tiv of Central Nigeria*, 1953.

Tiverton, municipal bor. of Devon, England, on the Exe, 14 m. NNE. of Exeter. The chief building of interest is the church of St Peter. Textile manuf. is the chief industry. Here is Blundell's School (q.v.). Pop. 11,200.

Tivoli (anc. Tibur), It. tn, in Lazio (q.v.), 15 m. ENE. of Rome (q.v.). It stands 800 ft above sea-level, on the Aniene (q.v.), at the point where the riv. forms a series of falls down to the Campagna di Roma (q.v.); these cascades have been celebrated for their beauty since classical times, and in modern times they have produced electric power for Rome. In Horace's day T. was the resort of wealthy Romans; the ruins still exist of fine Rom. villas, in particular a magnificent villa built by Hadrian (q.v.), and of mausolea, aqueducts, and a temple of Vesta. The modern tn has a cathedral, interesting churches, and villas, the gardens of which (notably those of the 16th-cent. Villa d'Este) are extremely beautiful. Much damage was done to the tn during the Second World War. The wine of T. has long been known, iron is worked, and there is a trade in oil. Pop. 24,600.

Tizard, Sir Henry Thomas (b. 1885), Brit. scientist, educ. at Westminster School and at Magdalen College, Oxford. Fellow of Oriel College, Oxford, and, from 1911 to 1921, lecturer in natural science. He was assistant controller of experiments and research in the R.A.F. 1918-19; permanent secretary of the dept of scientific and industrial research (q.v.), 1927-9; Rector of the Imperial College of Science and Technology, 1929-42; and Chairman of the Aeronautical Research Committee, 1933-43. He was president of Magdalen College, 1942-6, being the first scientist to hold such a position at Oxford, and was Member of the Brit. Air Council, and chief scientific adviser to the Ministry of Aircraft Production. From 1934 to 1945 he was a development commissioner; and Chairman of the Advisory Council on Scientific Policy and Defence Research Policy Committee, 1946-52.

Tlaxcala, agric. inland state of Mexico and its cap. The state, which has an area of 1555 sq. m., lies on the Mexican plateau, average height 7000 ft, rising in Malinche volcano to 13,454 ft. In the days of the great Aztec empire, T. maintained a sturdy independence within her mt fastnesses till, in 1519, she became the ally of the Spaniards under Cortés. The cap. lies 60 m. SE. of Mexico City, and has the oldest church in the country, dedicated to San Francisco (1521). Pop. (state) 284,600; (tn) 3250.

Tlemcen, tn in the dept of Oran, Algeria. The Rom. *Pomaria*, it was later the Moorish cap. It fell to the French in 1842. It has synagogues, mosques, and a museum of antiquities. It exports blankets, olive oil, and alfa, and manufs. leather work and native carpets. Rash-gun, which has a lighthouse, is its port. Pop. 54,300.

Tmesis (Gk *temnein*, to cut) is the separation of parts of a word by insertion of one or more words. It is very rare in English, though it appears in jocular expressions like 'abso-bally-lutely.' In Kipling we find 'If there be trouble to herward,' and Gerard Manley Hopkins writes 'brim in a flash full' in one of his poems. See also FIGURE OF SPEECH.

Toad, the name usually applied to members of the family Bufonidae which number more than 100 species. They differ from frogs chiefly by the total absence of teeth, and in certain anatomical features, such as the shoulder girdle and the sacral vertebra. In Brit. T.s a large gland, called the *parotid*, occurs, but this is absent from the frogs. It appears to be necessary for the secretion to come into contact with the blood through an abrasion or other means to be noxious. The skin of the T. is drier and more warty than that of the frog. The 2 Brit. T.s are the natterjack (*Bufo calamita*) and the common T. (*Bufo vulgaris*), which is generally distributed over Great Britain, though absent from Ireland. It has longer hind limbs than the other and is able to hop. Its eyes are more lateral and the irises reddish-copper colour. The females are usually larger than the males. The natterjack, which is local in England, cannot hop, as the hind limbs are too short, but it is able to run and is often called the running T. Its eyes are more prominent and the irises greenish-yellow; a thin yellow line runs along the middle of the back. During the breeding season the males croak very loudly and the eggs are laid in strings. The value of T.s to the farmer and gardener cannot be exaggerated, as they feed entirely on insects, millipedes, woodlice, slugs, and snails. They are quite harmless to man.

Toadflax, or *Linaria*, genus of plants and sub-shrubs (family Scrophulariaceae), with a spurred corolla. Of the natives of Britain *L. vulgaris*, the T., with yellow flowers, and *L. repens*, pale T., are perennial; *L. peltisseriana* is an ann. *L. cymbalaria*, Mother of Thousands, Pennyleaf, or Pennywort, is a perennial from S. Europe, naturalised in Britain; as is *L.*

purpurea, the Purple T. Many species are grown in gardens.

Toadstool, common name for the fruit-body of an *Agaric* fungus, not a mushroom or a bolete. See FUNGI.

Tobacco, plant of the genus *Nicotiana* (family *Solanaceae*) from which is manufactured smoking and chewing T., cigarettes, cigars, and snuff. There are over 50 varieties of the plant, many of which are cultivated in gardens, but only a few varieties are used for smoking purposes. The varieties of most importance to smokers are *Nicotiana Tabacum* and *Nicotiana Rustica*. The former, a native of the W. Indies, bears pink or rose-coloured flowers and grows from 2 to 9 ft high. The bulk of T. used in the trade of most countries of the world is

potash. Sowing takes place in the early spring. The seed is minute, 1 oz containing 300,000-400,000 seeds, and a table-spoonful being sufficient to sow a bed covering 100 sq. yds. The seed is usually mixed with ash or flour which are white, so that the sower can see where it falls and thus ensure even distribution.

After sowing, the bed is covered with cheese cloth or grass to protect the plant in the early stages of growth. When the plants are 5-6 in. high they are transplanted by hand into fields which have been thoroughly broken up by repeated harrowings. In land that does not drain easily they are usually set in ridges. About 4200 plants are set to the ac. Very careful cultivation is essential. 'Topping,' the cutting away of the stalk carrying the top leaves and the flower bud, is necessary to prevent seeding and to put more strength in the remaining leaves, usually 10-16 in number. Harvesting takes place in the hottest part of the year. Leaves may be picked individually as they ripen (known as 'priming'), or by the whole-plant method, after which they are conveyed to barns for curing.

Curing. Curing is an operation requiring skill and experience. There are 4 methods: flue-curing; firing; air-curing; and sun-curing. Flue-curing barns are heated by iron flues and the leaves are hung above the flues. No smoke comes into contact with the T. Flue-curing is done in 3 stages: yellowing the leaf; fixing the colour; and drying out the stem; and the whole operation takes 4-5 days. In fire-curing the T. is hung in the barns over wood fires lit in trenches in the floors and the smoke comes into direct contact with the T. The length of the process varies from a week or 10 days to 6 weeks. Generally speaking, the longer and more gradual the process, the better the result. For air-curing the T. is hung in the barns, protected from the rain, but exposed to the passage of air, and the curing is a natural process extending over about 2 months. Sun-curing is a similar process except that in the early stages the leaf is exposed in the open to the sun's rays.

Production and Types of Tobacco. The production of T. is world-wide, extending as far N. as Sweden and as far S. as New Zealand. In some countries, China for example, the production is almost entirely for domestic use, and in others, England for example, because of unsuitable climatic conditions, only tobacco of low yield and poor smoking quality can be produced commercially. The prin. types of T. and the main exporting countries are as follows: (1) *Flue-cured tobaccos, Brights and Semi-brights.* U.S.A. (N. and S. Carolina, Georgia, Virginia); E. Canada; Nyasaland; Rhodesia; some parts of India; and Brazil. This is the type of T. most used in the U.K., where most cigarettes are made from it, and it is also extensively used in pipe T. It is grown on light, sandy soil and obtains its nourishment from applications of chemical fertilisers. It has a characteristic bright colour. (2) *Burley Tobacco and other*



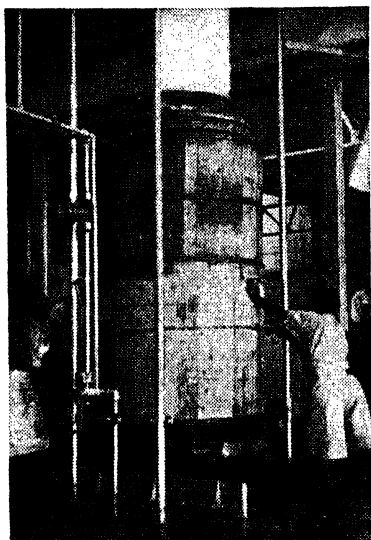
The Imperial Tobacco Co. (of Great Britain and Ireland) Ltd., Bristol

HARVESTING TOBACCO IN THE U.S.A.

produced from this variety. The latter, a native of Mexico, bears greenish yellow flowers, and is a much smaller plant than *Nicotiana Tabacum*. *Nicotiana Rustica* was cultivated by the anc. Mexicans and by the N. Amer. Indians, but early in the 17th cent. it was largely superseded by *Nicotiana Tabacum*.

Growth and Cultivation. T. seedlings are grown in sheltered level ground containing loamy, mellow soil, which is burnt to a depth of 3 in. to kill all weeds, insects, etc., and deposit the essential

Air-cured tobaccos. U.S.A. (Kentucky; Tennessee; Maryland); E. Canada; parts of India; and Nyasaland. This type is used in very large quantities in the U.S.A. both for cigarettes and pipe T.s. It is used to a lesser extent in the U.K. for pipe T.s. only. It is grown from distinctive kinds of seeds, and its reddish-brown colour is obtained by air-curing. (3) *Dark Fired Tobacco.* U.S.A. (Kentucky, Tennessee, Virginia); E. Canada; Nyasaland; and S. Rhodesia. This type of T. is used for the manuf. of roll and shag T. and produces a strong smoke. It is a large heavy type of leaf grown on richer soil than the flue-cured variety. (4) *Latakia and Latakia type tobacco.* Syria (dist. of Latakia) and Cyprus. Latakia T.,



The Imperial Tobacco Co. (of Great Britain and Ireland) Ltd., Bristol
PACKING LEAF TOBACCO INTO CASKS,
SOUTHERN RHODESIA

has a flavour peculiar to itself and is used in the U.K. entirely in pipe-smoking mixtures. It is the smallest of all the tobacco plants, and its leaves are barely 2 in. in length. The whole plant is cured by heavy firing, which gives the characteristic black appearance and distinctive flavour. (5) *Oriental Tobacco.* Turkey; Greece; Bulgaria; and the borders of the Black Sea. Oriental has a highly distinctive aromatic flavour. It is used in Oriental and 'blended' brands of cigarettes. The Oriental T. plant is of small growth, producing a delicate type of leaf. (6) *Cigar Tobaccos, see CIGAR.*

History. The use of T. dates from remote antiquity amongst the natives of

the Amer. Continent. It is mentioned in the observations (1497) of Romano Pane, a friar who accompanied Columbus on his second voyage, as being used medicinally and in religious ceremonies by the tribes of the Antilles. Gonzalo Fernandez de Oviedo in 1526 described the plant and the native custom of inhaling smoke from the burning leaf through a hollow forked cane held to the nostrils. This cane was called tobacco by the natives, and the name was applied by the Spaniards to the primitive cigar and to the plant itself. T. was introduced into Europe in 1559 by Francisco Hernandez de Toledo, a physician who had been sent by Philip II of Spain to investigate the products of Mexico. Jean Nicot, the Fr. ambas. to Portugal, learned of T. in Lisbon and introduced it to the Fr. court in 1560. His association with the plant is commemorated by the botanical name *Nicotiana* and the word nicotine. On its first introduction to Europe T. was valued for its medicinal properties, and it was considered 'a panacea for all the ills that the flesh is heir to.' Sailors returning from the Americas first introduced smoking to England about 1565. Sir Walter Raleigh brought the practice to Court circles. By the end of the 17th cent., despite attempts to exterminate the practice by means of stringent laws, heavy punishment, and even excommunication from the church, T. was in general use in most parts of the world. The introduction of cigarettes and the two World Wars popularised smoking among women, although women smoked in earlier times, particularly in some E. countries, where it was and still is customary. Smoking by children and the sale of tobacco to them is now forbidden by law in many countries, including Great Britain.

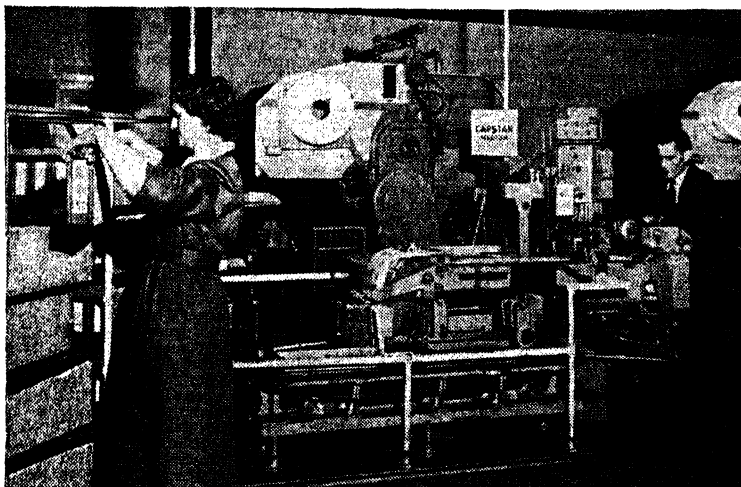
Tobacco in Great Britain. T. was introduced into England in about 1565 by sea captains and sailors returning from America. Famous men associated with its introduction are Sir John Hawkins, Sir Francis Drake, Capt. Ralph Lane (Governor of Virginia), and Sir Walter Raleigh, who popularised smoking in Court circles. By the end of Elizabeth's reign smoking was general among all classes and both sexes. Despite vigorous opposition by James I, who pub. 'A Counterblaste to Tobacco' and imposed heavy T. duties, the popularity of T. continued. The prosperity of the Colony of Virginia was built up on T. exports. The heavy duty imposed on imported T. led to considerable quantities being grown in Britain in the 17th cent., but under the Protectorate and in Charles II's reign, in order to safeguard the gov. revenue and to protect the Virginia industry, its cultivation in Britain was prohibited. During the Great Plague (1665) T. was widely used as a prophylactic, and even children were encouraged to smoke. Smoking by women and children was common for many years afterwards. In the Georgian Period, snuff-taking displaced smoking in fashionable circles. Cigar smoking became fashionable in Britain at the beginning of the 19th cent.

Cigarettes were introduced into the country in the middle of the 19th cent. by soldiers returning from the Crimean War. T. manuf. came under strict gov. supervision in the first half of the 19th cent. and the Pure Tobacco Act of 1842 still remains in force. At the beginning of the 20th cent. about two-thirds of the T. smoked in Great Britain was in pipe T. form and only about one-third in cigarettes. By the beginning of the First World War, cigarettes had nearly gained equality in sales with pipe T.s. The war accelerated the change in trend, and also popularised smoking amongst women. The swing to cigarettes and increased

with private individuals growing T. for their own personal consumption.

Bibliography. A. E. Tanner, *Tobacco*, 1912, 1945; G. L. Apperson, *The Social History of Smoking*, 1914; C. M. MacInnes, *The Early English Tobacco Trade*, 1926; Count Corti, *A History of Smoking*, 1931; W. W. Garner, *The Production of Tobacco*, 1946.

Tobago, is. of the Brit. W. Indies, in lat. 11° 9' N. and long. 60° 40' W., about 75 m. SE. of Grenada and 19 m. NE. of Trinidad. The is. is 26 m. long and 7½ m. wide and has an area of 116 sq. m. T. is mountainous in the centre and at the NE. end, and undulating and flat in the



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CIGARETTE-MAKING MACHINE

smoking by women have continued, and the Second World War has accentuated the trend.

The rate of tobacco duty in the U.K. increased from 3s. per lb. in 1900 to 3s. 8d. in 1914, to 9s. 6d. at the beginning of 1939, to 58s. 2d. per lb. in 1948, and to 61s. 2d. in 1956. From 1900 to 1949 the U.K. Gov.'s revenue from the T. duties increased from nearly £11m. a year to £602m. a year, and now, except for Income Tax, the T. duties are the gov.'s largest single source of revenue. A committee appointed by the Treasury in 1923 recommended against gov. financial support of T. growing in England, on the grounds of unsuitable climatic conditions. The growing of T. in the U.K. is subject to Excise regulations and the payment of duty, but in 1948 the gov. announced that although not prepared to repeal the Excise duty on home-grown T., they would not for the time being interfere

S. and W. The highest peak is 2100 ft. Deep fertile valleys run down from either side of the main ridge. The prin. riv. is the Courland, named after the Norse duke who in the 17th cent. ruled the is. almost as a sovereign. Scarborough (pop. 1250) on the S. coast, formerly called Port Louis, is the cap. Its new deep-water harbour was opened in 1953. The only other tn is Roxborough (pop. 1000). Sugar was once the staple industry, but it was ruined by the foreign sugar bounties. Cacao, coconuts, and limes have taken its place. The climate is most agreeable; the mean temp. is 80° F., but owing to the long seaboard the heat is generally tempered by a cool sea breeze. In the central and Windward dists. the rainfall varies from 85 to 95 in. and in the N. may exceed 100 in. There is a civil airfield at Crown Point, the SW. tip of T.; also a gov. wireless station and telephone system. At a distance of 1½ m. from the

NE. end of T., off the vil. of Speyside (25 m. from Scarborough), is the is. of Little T. or Bird of Paradise Is., the only place in the W. hemisphere where these birds are found in their wild state. The rocks between it and T. are known collectively as Goat Is.

T. is known to many people by its nickname, Robinson Crusoe's Island. For though the actual story of Crusoe's life on his is. was based largely on Alexander Selkirk's adventure on Juan Fernández, there can be no doubt that Defoe, in describing his mythical is., had T. in mind, and it may safely be assumed that 'Robinson Crusoe Cave,' near Scarborough, is well named. The hist. of T. shows that it changed hands a dozen times during a period of less than 2 cents., the reason being that it was an attractive fertile is. lying near enough to the Guiana coast to be a jumping-off ground for those anxious to explore the Orinoco, and also because its sheltered bays gave a safe anchorage with deep soundings.

Columbus discovered T. in 1498 and named it 'Tabago,' from a notion that it resembled in shape the Carib tobacco pipe. Sir Robert Dudley, natural son of the Earl of Leicester, is believed to have visited T. and hoisted the Eng. flag in 1580. Nearly 36 years later Eng. colonists from Barbados effected the first settlement, but no successful settlement was made for nearly a cent. and a half after the discovery of the is. For the ensuing 40 years the is.'s hist. was a ding-dong struggle between Dutch colonists and some Baltic settlers from Courland, varied by Fr. and Eng. invasions. After that and for the next 20 years the is. was declared neutral but, nonetheless, alternated between Fr. and Eng. possession until, in 1814, it was finally ceded to England. T.'s first constitutional gov. was set up about 1763 in the letters patent for the governor of Grenada, which dependency at that period comprised also Dominica, St Vincent, and Trinidad. In 1783 the is. was ceded to France, but was recaptured in 1793, when it was erected into a separate gov. under a capt.-gen. and governor-in-chief, with a council appointed by the Crown and a House of Representatives. By an Act of 1855 T. was given an executive committee or Privy Council, that being its nearest approach to self-gov. In 1877 T. became a Crown colony, and in 1888 was amalgamated with Trinidad. Ten years later it became a ward of the United Colony of Trinidad (q.v.) and Tobago. T. is a member of the Caribbean Federation (q.v.). See also WEST INDIES, *West Indian Federation*. Pop. 27,000. See H. I. Woodcock, *History of Tobago, 1867*; E. C. Digby, *Guide to Trinidad and Tobago* (2nd ed.), 1936-7; C. Reis, *The Government of Trinidad and Tobago* (3rd ed.), 1948; C. E. R. Alford, *The Island of Tobago* (revised ed.), 1953.

Tobermory, seaport and burgh of Argyll, Scotland, on a bay of the same name, 30 m. from Oban. It has a good harbour. In 1588, following the scattering of the Sp. Armada, a Sp. galleon sank in T. bay

with, it was believed, a large cargo of treasure. In 1912 Col. Foss recovered some coins and silver goblets, and the search is being continued. Pop. 700.

Tobit, Book of, a deuterocanonical book, placed by the Church of England in the Apocrypha (see BIBLE). It is a Haggadic version of an old tradition, embodying in the form of a delightful adventure and love story a series of moral and religious lessons. Its date is given by Ewald as about 350 bc, but Hitzig places it in the reign of Trajan.

Tobogganing (from an Indian word, *tobaakan*, meaning sledge), practice of sliding down natural or artificial slopes of snow or ice. The Canadian toboggan consists of a flat surface curled up in front. It is about 5 ft long by 2 ft broad. T. in its advanced form takes place really only on the Cresta, a valley behind St Moritz, Switzerland. The sport was started in 1885 by Eng. visitors and took the form of an ann. race between those at St Moritz and those at Davos, the race being fought out alternately at Davos on a course from Klosters and at St Moritz on the Cresta. The former is now closed, but the Cresta continues. From being a snow run it is now an enclosed track of solid ice 1 m. long dropping at an average slope of 1 : 7. There are sev. well-known corners, known as banks, such as the Battledore and Shuttlecock. Down this run, a steel chassis is employed with 2 steel runners rounded in the front, about 3 ft long and about 13 in. apart. On this chassis is a sliding seat. The back parts of the runners are grooved. The method of riding is to lie prone with the body on the sliding seat forward, and on coming to a corner the rider pushes his body back upon the seat so that the weight is on the back part of the runners where are the grooves. Steering is effected by pushing the nose of the toboggan round, mechanical forms of steering not being allowed. Great skill and judgment are required for fast riding. Racing is done against time, taken by the breaking of 2 electric contacts, at the start and the finish. A running start from 10 ft behind the line is allowed; this requires much skill and agility. Finishing speeds are over 85 m.p.h.

Riding the Cresta is recognised as an Olympic event. The great ann. race of the Cresta Run is the Grand National, which is usually held about the middle of Feb. The next most important race is the Curzon Cup, which is run from the auxiliary starting-point of Junction, and is about two-thirds of the length of the course.

Bobsleighing is to be distinguished from T. The bobsleigh is formed of a frame carried on 2 sleighs fitted with steel runners. Steering is effected by swinging the front runners; this is done by cords or a steering-wheel. Under rules at present in force, riders sit facing the direction they are going. At one time the position was prone with heads first, but this practice has now been banned. There are many famous places where this sport is popular, notably at St Moritz in Switzerland, Garmisch in Bavaria, Cortina d'Ampezzo

in the Dolomites, and at Lake Placid in America. 'Bobs' vary in size, there being races for those carrying 2 people and a bigger type carrying 4 people. The track is usually of ice and beaten-down snow, and the banks are heavily iced. International races take place, and 'bobbing' has been included among the Olympic Winter Sports seasons.

Tobol, navigable left trib. of the R. Irtysh in SW. Siberia. It rises in the Turgay plateau and flows NE. through a fertile region with rich mineral resources now being rapidly cultivated and industrialised (see KUSTANAY). Length 1000 m.

Tobol'sk, tn in the Tyumen' Oblast of W. Siberia, on R. Irtysh, centre of a lumbering and dairy-farming area, and supply point for the N. part of the Tyumen' Oblast. There is some industry, and an old bone-carving craft is still carried on. It is an important local cultural centre (theatre founded 1705). Pop. (1939) 32,000. T. was founded by Russian Cossacks in 1587 near the old cap. of the Siberian Khanate; it was cap. of Siberia 1596-1824, prov. cap. till 1923. It has been a place of banishment, including that of Nicholas II (1917-18).

Tobruk, or Mersa-Tobruk, port in the prov. of Cyrenaica, Libya. It has an excellent harbour, and was occupied by Italy in 1912. It was the scene of much fighting in the Libyan campaign of the Second World War. In Gen. Wavell's advance against Graziani's It. army the Brit. force entered the stronghold on 22 Jan. 1941, some 25,000 It. prisoners of war being taken at a cost of less than 500 Brit. casualties. With the arrival of Rommel's Ger. forces, the Brit. force withdrew to the E., T. being by-passed and isolated. For 8 months the garrison defied land attacks and air bombardment, striking back with much success at the enemy lines of communication, whilst local command of the sea made it possible in that period to land 34,000 tons of supplies and 29,000 troops in T., and to bring off 33,000 men to Egypt. T. became a pivotal point in the tank battles of the late autumn of 1941, Rommel's object being to prevent Gen. Auchinleck's Brit. forces near Rezegh from effecting a junction with the isolated garrison at T. At the end of Nov., after 7 months' siege by Rommel, the garrison carried out a strong sortie, and Rezegh being captured by co-operating forces, these and the T. garrison at length joined hands. But the position was precarious, and the Germans broke the T. corridor again on 2 Dec. Once more it was relieved by the Brit. forces. In the spring of the following year it was again the key point in the campaign. The British had consolidated a line from El Gazala to Bir Hacheim; behind this line in the area before T. was a force of 100,000 to meet the 40,000 Italians and 50,000 Ger. troops now at Rommel's disposal. In June 1942 the main Allied outpost at Bir Hacheim was lost to Rommel, who then concentrated his whole weight against the main positions covering the T. area. The results were

disastrous, the Brit. forces under Gen. Ritchie being drawn into an ambush (13 June). This marked the turning-point of the campaign. On 18 June El Adem and Rezegh were abandoned and the Brit. army retired to the Egyptian frontier, leaving a strong garrison in T. in the vain hope that it might repeat the previous triumph as a strong point hampering the enemy's whole plan. On 20 June T. with most of its stores and its garrison of nearly 2 divs., largely S. African forces, fell to Rommel after a single day's massed attacks. This gave him the best harbour between Alexandria and Tripoli, and so helped to relieve his land lines of communications. Later in the year the reinforcement of the Eighth Army (q.v.) under Gens. Alexander and Montgomery reversed the fortunes of war and T. was recaptured on 13 Nov. 1942. See also AFRICA, NORTH, SECOND WORLD WAR, CAMPAIGNS IN.

Toc H, a movement to bring together into interdenominational Christian fellowship men and women of every class and opinion for the purpose of social service of all kinds, with groups and branches throughout the world. The name, Toc H, comes from the army signallers' designation of the initials, T. H., which stood for Talbot House, opened in Dec. 1915 at Poperinghe in Flanders as a chapel and club for soldiers. It was a memorial to Gilbert Talbot, who was killed in July 1915, and was founded by his brother, Neville Talbot, later Bishop of Pretoria, and the Rev. P. B. ('Tubby') Clayton. In 1920 Clayton formed a small Toc H group in London, and in 1922 Toc H was incorporated by royal charter. Toc H church, All Hallows by the Tower, largely destroyed in the Second World War, has now been rebuilt. The *Toc H Journal* is pub. monthly.

Tocantins, riv. of N. Central Brazil, rising in the state of Goiás and flowing N. into the Atlantic Ocean through the Rio Pará. Its largest trib. is the Araguaia. Its course, which is much interrupted by rapids, is navigable only in some parts. Its economic value rests in the babaçu palms watered by its upper reaches. Length 1600 m.

Toccata (from It. *toccare* = lit. to touch, figuratively to play). Originally, in the 17th cent., simply 'a thing to play,' as distinct from *cantata*, 'a thing to sing.' But it soon acquired a sense of touching a keyboard instrument, for the purpose of trying or testing it, which meant that it usually contained scales, shakes, and other brilliant figuration, often interspersed with slow chordal passages. Modern T.s usually lay stress on brilliance and rapid execution alone, and are often more or less uniform in figuration throughout; there is in fact little or nothing to distinguish them from concert studies. Well-known examples are found in the works of Bach, Schumann, Debussy, and Ravel.

Tocopilla, tn and port of Antofagasta prov., Chile, 120 m. N. of Antofagasta and 110 m. S. of Iquique. Exports include nitrate, iodine, sulphate, and copper ore.

T. supplies electric power to the important copper mine of Chuquicamata. Pop. 15,400.

Tocqueville, Alexis Charles Henri Maurice Clérel de (1805-59), Fr. historian, b. Verneuil, Seine-et-Oise, accompanied Gustave de Beaumont to America to study prisons in 1831, and took the opportunity to collect materials for his *De la Démocratie en Amérique*, 1835, a work of peculiar interest as the first reasoned and more or less unbiased exposition of popular gov. in that country. A moderate Liberal in politics, he was elected vice-president of the Assembly in 1849, was dismissed when Louis Napoleon became emperor, and met with an enthusiastic reception from John Stuart Mill and other prominent Whigs when he visited England. He pub. *Ancien Régime et la Révolution*, 1856. His *Souvenirs* were written in 1850-1, first pub. in 1893, and ed. and trans. with an introduction, by J. P. Mayer in 1948. See studies by E. d'Eichthel, 1897; R. P. Marcel, 1910; H. Göring, 1928. See also R. Sottan, *French Political Thought in the Nineteenth Century*, 1931.

Todas, aboriginal people living in the Nilgiri Hills of S. India. They devote their labour almost exclusively to their herds of buffalo, and exchange dairy produce for grain and other goods with neighbouring tribes. The ordinary herds are tended by men and boys without any special ritual; but the sacred herds of buffalo are the object of elaborate rituals performed by official herdsmen at sacred dairies. The T. practise an interesting system of polyandry (q.v.). See W. H. R. Rivers, *The Todas*, 1906.

Todd, Ruthven (1914-), poet, essayist, and novelist, b. Edinburgh. He was educ. at Fettes College and the College of Art, Edinburgh. A leading authority on William Blake, he produced a modern ed. of Gilchrist's *Life of Blake*. A collection of essays entitled *Tracks in the Snow*, 1946, deals with the mythology of the 18th cent. in its effects upon Blake, John Martin, and Henry Fuseli, and with the influence of science upon the artists and writers of the period. He pub. 4 books of poems, including *The Planet in My Hand*, 1947, and *In Other Worlds*, 1950. His first novel, *Over the Mountain*, 1939, an allegorical fantasy, was followed by *The Lost Traveller*, 1942, and *The Ruins of Time*, 1950.

Toddy, in the N. usually a drink of spirits, sugar, and hot water with a slice of lemon; in tropical countries beverages fermented from the sap of various palms.

Todhunter, Isaac (1820-84), mathematician, graduate of London and Cambridge, b. Rye. At St John's College at Cambridge he was a scholar, fellow, and lecturer in turn, heading the degree list as senior wrangler, and gaining the mathematical blue ribbon, Smith's Prize. He was a member of the council of the Royal Society, of which he was elected a Fellow in 1862. His text-books on algebra, Euclid, trigonometry, and calculus attained a world-wide circulation, and he made original contributions to the cal-

culus of variations and the theory of probability. Amongst his more important works may be noticed *History of the Theories of Attraction*, 1873, *Elementary Treatise on Laplace's, Lamé's and Bessel's Functions*, 1875, and with Pearson, *History of Theories of Elasticity*, 1886-93.

Todi, Jacopone da, see JACOPONE DA TODI.

Todi (anc. *Tuder*), It. tn, in Umbria (q.v.), on a hill overlooking the Tiber valley, 24 m. S. of Perugia (q.v.). It has a cathedral, and Etruscan and Rom. remains. Pop. (tn) 3900; (com.) 21,000.

Todmorden, municipal bor. in the W. Riding of Yorks, England, 19 m. NNE. of Manchester. It has cotton weaving and spinning factories, foundries, and machine shops; and there are coal mines in the area. Pop. 19,074.

Todt, Fritz (1891-1942), Ger. engineer, b. Baden, famous as the constructor of the Ger. W. Wall (q.v.), and the *Autobahnen* (motor roads) in Germany. He became Inspector-General of Reich Roads in 1933 and visited Britain in 1937 to study Brit. traffic problems. He was made maj.-gen. in 1939 in recognition of his work in the W. anti-aircraft defensive zone, and was appointed Reich Minister of Arms and Munitions in Mar. 1940.

The construction of the Ger. W. Wall had to be carried out at great speed because of the tense political situation, and for this purpose T. created his 'Todt Organisation,' by the aid of which the task was completed with almost incredible speed. T. was also largely responsible for the very efficient construction of road-transport supplies, upon which the Nazi 'Blitzkrieg' mainly depended.

Tofua, volcanic is. in the Tongan Group.

Toga, the formal dress of a Rom. citizen in tn, and obligatory on public occasions. It was made of white wool. Laid flat, it resembled a semicircle with the straight side bent outwards to form an obtuse angle. The T. measured lengthwise about 3 times, in width about twice, the wearer's height. The method of donning a T. was as follows. It was formed into thick folds lengthwise and cast over the left shoulder so that one-third of the total length hung down in front; the remainder was passed behind, under the left arm, and thence over the left shoulder. The left arm being now almost covered, the part lying across the back was spread to cover the right shoulder, and the front was arranged in a series of folds, forming a pocket (*sinus*). Curule magistrates and boys wore the *T. praetexta*, i.e. with a purple border; on attaining manhood the *T. virilis*, without the border, was assumed. The *T. picta* (embroidered) was worn by gens. at their triumph; the *T. pulla* (of dark stuff) by mourners and persons impeached. After Augustus, the emperors commonly wore a purple T. See L. Wilson, *The Roman Toga*, 1924.

Toggenburg, upper valley of the R. Thur, canton of St Gallen, Switzerland. It extends for about 20 m. The chief vils. are Lichtensteig, Wattwil, and Nesslau. Dairy-farming, fruit-growing, and agriculture are carried on.

Togliatti, Palmiro (1893-), It. Communist politician, formerly a journalist. Lived in exile in Russia during the Mussolini régime, and became a prominent member of the Comintern. He returned to Italy in 1944 and became vice-premier (1944-5), and minister of justice (1945-6). An unsuccessful attempt was made on his life in 1948. He has consistently attacked Italy's alliance with the W. and has supported Moscow unquestioningly through every post-war phase of Soviet policy.

Togo, Heihachiro, Count (1847-1934), Jap. adm., b. Kagoshima. He studied in England at the Thames Naval College, Greenwich, and on the *Worcester*, 1871-3. He had already entered the Jap. Navy. Made adm. in 1904, he acted during the Russo-Jap. War as commander-in-chief of the Combined Fleet. His exploits during this war were numerous, the chief being the bombardment of Port Arthur.

Togoland, formerly (1884-1914) a Ger. colony, and now (a) part of the state of Ghana; (b) an autonomous rep. within the Fr. Union. In Aug. 1914 the Germans surrendered their colony unconditionally to Brit. and Fr. forces. Britain administered the W. portion, 13,041 sq. m., as a part of the Gold Coast (now Ghana, q.v.), later under mandate by the League of Nations. The pop. in 1954 was 423,000 Africans and a mere handful of Europeans. Terms of the trusteeship for Brit. T. under the U.N. Charter were approved in 1946 (Cmd. 6963, H.M.S.O.). In 1948 an Anglo-Fr. standing consultative commission was formed, which agreed on co-ordination of medical and educational services, on economic exchanges, and on freedom of movement across the boundaries. In May 1956 a plebiscite was held under the auspices of the U.N. to estab. the wishes of the people in respect of integration with Ghana. Of the total registered electorate of 192,432, 66,529 were in favour of Brit. administration under U.N. control. In the event, T. was incorporated with Ghana, but there was evidence of serious dissension.

France administered 20,404 sq. m. (which included all the coast-line) between the Gold Coast (Ghana) on the W. and Fr. Dahomey on the E., as part of the Federation of W. Africa. Later it became a trustee ter. of the French under the U.N. In Aug. 1957 the Territorial Assembly of Fr. T. conferred self-gov. on the ter. within the Fr. Union, which granted home rule except regarding foreign relations, defence, currency, and internal security, which remained the responsibility of France. The new rep. granted equal rights for all inhab., created a Legislative Assembly, and a cabinet was formed in Sept. 1957 with M. Grunitzky as Prime Minister. A referendum in Oct. confirmed—by 62 to 80 per cent., according to the dist.—the new status of the ter. It continues to be represented in the Fr. National Assembly, the Council of the Rep., and Assembly of the Fr. Union. The pop. is 738,000 Africans and 1100 Europeans, and the cap. is Lome.

Considering the 2 ters. as a whole, T. is bounded on the N. by the Upper Volta and on the S. by the Gulf of Guinea. A chain of highlands runs from SW. to NE., the highest point being Mt Atakpse (3248 ft). The chief rvs. are the Volta, which formerly separated T. from Ghana, its trib. the Oti, the Mono, and the Zio and Haho, which empty into Togo Lagoon. The climate is unhealthy. Coffee, rice, and cocoa are grown, but the last is the only crop of commercial value. The dist. is rich in iron, which is smelted by the Africans. Some cattle are reared. The chief port, Lome (pop. 280,500 Africans and 760 Europeans), is connected by rail with Aneho, the second port, and Palime for Misaböhe and Atakpame, all in Fr. ter. A trade school has been estab. at Yendi. Straw-plaiting, weaving, wood-carving, smith-work, and the making of earthenware are the chief industrial occupations of the natives, who, in the S., are of Bantu stock. They speak 30 different languages, of which Ewe is the chief. The inhab. of the N. are of Hamitic descent and speak 16 languages. See General Maroix, *Le Togo*, 1938; *Report on the Administration of Togoland*, H.M.S.O., 1955.

Tojo, Hideki (1884-1948), Jap. statesman and gen., b. Tokyo, came into office with the expansionist elements in the Army and Navy and, in 1940, when Prince Konoe founded his new National Party, T., as war minister, was one of the 2 leading figures in the Cabinet formed by Konoe, whom he succeeded as Prime Minister. It was T. who ordered soon afterwards the attack on Pearl Harbour. During the easily won victories in 1941-2, before the Allies could deploy their strength, T. assured his position at home in 1942 by dissolving the Diet and appointing a National Service Political Council to control the Diet in the interests of the gov. But in 1944 T. began to realise that the War was closing in on the heart of Japan, and he therefore reorganised the High Command by combining, and himself taking, the posts of war minister and army chief of staff and combining the posts of navy minister, and navy chief of staff. He also speeded up shipbuilding and gave priority to aircraft production. But despite these measures the tide of allied victory rolled on, and when Saipan fell, T. resigned and was succeeded by Gen. Koiso. After the Jap. collapse T. was tried in Tokyo (1947-8) and hanged on 23 Dec. 1948.

Tokaj (anglicized Tokay), tn of Hungary, in Borsod-Abaúj-Zemplén co., near the junction of the Tisza (q.v.) and the Bodrog, 28 m. E. of Miskolc (q.v.). The tn is at the E. ft of Mt T. (1690 ft), which gives its name to the celebrated wine produced on its slopes and in the surrounding hilly dist. of Hegyalja. Pop. 5900.

Tokat, (anc. Dazimon), tn and il of Asiatic Turkey, 52 m. NNW. of Sivas. It manufs. copper-ware and leather, and there are coal and iron deposits in the vicinity. Pop. (il) 388,724; (tn) 21,700 (1950).

Tokay, see TOKAJ.

Tokelau (or Union) Group of Pacific is., lies about 270 m. due N. of Apia, W. Samoa. It consists of 3 atolls, Atafu (or Duke of York Group), Nukunono (or Duke of Clarence Group), and Fakaofo (sometimes called Bowditch). Attached to W. Samoan administration from 1926 to 1948, when the Group became part of New Zealand. Total land area 2500 ac. Copra is the chief product, and excellent hats and mats are made from pandanus leaves. The Polynesian pop. was estimated in 1954 at 1750.

Token (Money), coin of higher nominal than intrinsic value; or a stamped piece of metal issued as a limited medium of exchange, as for bus fares, and at a nominal value much greater than its commodity value; or anything of only nominal value similarly used, as a piece of paper currency.

Tokharian Language, see INDO-EUROPEAN LANGUAGES.

Tokitaro, Ando, see HIROSHIGE.

Tokyo (formerly Yedo), cap. of Japan, situated on the SE. side of the Is. of Hondo or Honshu in the Bay of Tokyo, on the delta of the Sumida R., which separates the city proper on the W. from the Kôto on the E. It was founded in 1457 by Ota Dokan, who built his castle here, and received its present name when the court moved thither from Kyôto in 1868. The tn was opened to foreigners in 1869. The magnificent palace, in a blend of Jap. and European styles, stands in the Fukiage park, not far from the anc. castle. To the E. of the palace lies the commercial and industrial part of the city, while the N. part is mainly educational, and contains the Imperial Univ., the Law School, First Higher Middle School, and numerous beautiful temples. In the W. and SW. are the foreign embassies and legations. The port of entry, Yokohama (q.v.), is 17 m. away and Haneda airport 10 m. S. of central T.

T. has suffered frequently from fire (many of the houses were, and still are, built of wood), and from storms, earthquakes, and epidemics. The gov. buildings had to be rebuilt after the fire of 1891. In Sept. 1923 great portions of the city were destroyed by a disastrous earthquake and the ensuing fire. Nearly 70,000 people were killed, and nearly a million migrated after the disaster. Reconstruction work was begun at once and completed by Mar. 1930. The important buildings were made both earthquake- and fire-proof; 3 large and 51 smaller parks were laid out to serve as refuges; and wherever possible improvements in planning were carried out.

T. was frequently and heavily bombed by Amer. aircraft, especially by Super Fortresses in 1945. According to the official estimates, more than 80 per cent of the houses in T. were completely destroyed. The present metropolitan area includes the whole of the former Tokyofu, and consists of 23 wards and 8 satellite cities, with a pop. of 8,224,000 (1956). It has 10 univs. and more than a hundred

colleges and technical schools; 378 high schools, 618 middle schools, and 908 primary schools; 44 museums, 58 libraries, and 28 public halls; 4 radio and 3 television stations (one of each is national). The daily circulation of newspapers is 5,500,000, and there are more than 1000 cinemas and theatres. The city and suburbs are well served by buses, trams, and underground railway. As well as being the political, educational, and artistic centre of Japan, T. is also a great industrial city; although traditionally noted for the production of toys, its largest industries are foodstuffs, printing, electrical apparatus, metal goods, machine tools, optical instruments, plastics, and textiles.

Tokyo Trials, see JAPANESE (WAR CRIMINALS) TRIALS.

Toland, John (1670-1722), theologian, b. near Londonderry, of Rom. Catholic parentage. Educ. at the univs. of Glasgow, Edinburgh, and Leyden, he became a protestant, then a rationalist. His work, *Christianity Not Mysterious*, 1696, was condemned by the House of Commons to be burnt. Later T. wrote *An Account of the Courts of Prussia and Hanover*, 1705. See studies by G. Berthold, 1876, and A. Lantoinc, 1927.

Tolbooth, term originally used in Scotland for a booth at a fair in which dues or tolls were collected and offenders against fair regulations were detained—whence it came to mean a prison. The most famous T. was the one in Edinburgh mentioned in *The Heart of Midlothian*. It stood near St Giles cathedral, and was pulled down in 1817.

Tolbukhin, Fyodor Ivanovich (1884-), see EASTERN FRONT IN SECOND WORLD WAR.

Tolbukhin (formerly Bazarjic, Bazargic, Dobrich), city of Bulgaria, in Varna prov., 26 m. N. of Varna (q.v.). It belonged to Turkey until 1878, and was in Rumania 1913-40. It has textile, metal, and food-stuff industries, and has a trade in agric. produce. Pop. 30,000.

Toledo: 1. Sp. prov., in Castilla la Nueva (q.v.), lying in the Tagus (q.v.) basin S. of Madrid (q.v.). In the N. is a rocky plateau, and in the S. are the Montes de T. (4350 ft). The valleys are fertile. Live-stock, including fighting bulls, is raised, and there are silk, cutlery, wine, oil, and pottery manufs. Area 5,926 sq. m.; pop 540,100.

2. (Anc. Toletum), Sp. city, cap. of the prov. of T., built on a rock above the Tagus. Important under the Romans, it became the cap. of the Visigoths (see GOTHs) in 418. In 711 it was taken by the Moors (q.v.), and in 1085 it became a cap. of Castile (q.v.), and, later, of Spain. In 1561 Madrid became sole cap. The tn centre is the Plaza de Zocodover, once the scene of *autos-da-fe*, masquerades, and bull-fights. To the S. is the ruined alcázar, and to the W. the great 5-aisled Gothic cathedral (13th-17th cents.) of the primate of Spain. There are many curious old streets and mansions. Sev. churches preserve paintings by El Greco (q.v.), once a resident of T. T. sword

blades were long famous, and fine knives are still manu., as well as silks and objects of church art. Pop. 41,800. See I. Marin, *Recuerdos de Toledo*, 1893; A. F. Calvert, *Toledo*, 1907; H. Lynch *Toledo* (Medieval Towns Series); M. Gonzalez Simancas, *Toledo*, 1929.

3. City, cap of Lucas co., Ohio, U.S.A., on Maumee Bay of Lake Erie 95 m. W. of Cleveland. It is a railway centre, airport, and oil pipeline terminus, and a prin. Great Lakes port, ranking high among world ports for the shipment of soft coal, and receiving much iron ore. Important in shipbuilding and oil refining, it manu. glass, automobiles, electrical equipment, and steel. T. has the city manager plan of government with proportional representation, and maintains a large public library, a noted Museum of Art, and the univ. of T. St Francis de Sales Cathedral is here. Pop. 303,600.

Toleration, doctrine that a citizen may adopt or discard any religion without state interference. T. became practically universal during the 19th cent.; but the rise of Fascism and Communism tended to restrict it in many countries, though most govs. still claim to support it. T. is not a direct offspring of the Reformation, which accepted the principle 'Cuius regio, eius religio,' i.e. a man should follow the religion of his king. But in effect this principle implied a theoretical equality of religions, and so paved the way for T. Modern indifference to religion also contributed to the development of T. Where it exists, it extends only to matters of doctrine; the State still exercises certain rights as a guardian of morality. See W. K. Jordan, *Development of Religious Toleration*, 1932-38; T. Lyon, *Theory of Religious Liberty*, 1903-39, 1937.

Toleration, Act. of, see under ACT.

Tolium, see TOLEDO.

Tolima, dept of Colombia, lying between the Central and E. Cordilleras. The volcano T. rises to 18,425 ft. the highest peak in Colombia. In contrast, the transshipment point for vitally important riv. traffic is located in the same dept. at Honda, on the Magdalena. Silver, gold, lead, copper, and sulphur are found, and there is agriculture and stock-raising. Cap. Ibagué. Area 8874 sq. m.; pop. 772,970 (1955).

Toller, Ernst (1893-1939), Ger. poet and playwright; b. Samotschin (Posen), son of a Jewish merchant. He fought in the First World War as a volunteer, and, being a Socialist, he was prominent in the struggle for power in Bavaria, 1919, and suffered imprisonment. A refugee from the National Socialists, he committed suicide in New York. His expressionist drama has communistic and pacifist tendencies. His plays, many of which were trans. into English, include *Maase Mensch*, 1921, *Maschinenstürmer*, 1922, *Hinkemann*, 1924, *Tag des Proletariats*, 1926, *Hoppla, wir leben!*, 1927; autobiography, *Eine Jugend in Deutschland*, 1933; verse, *Gedichte der Gefangenen*, 1921, and *Das Schwalbenbuch*, 1924. See W. A. Willbrand, *Ernst Toller and his Ideology*, 1945.

Tolls, tax imposed in consideration of some privilege. In the feudal system it meant the right to tollage one's vassals. Later it became the distinguishing mark of a turnpike road, i.e. a road having toll-gates or bars on it, called 'turns.' These 'turns' appear to have been first constructed about the middle of the 18th cent., when certain interested persons subscribed among themselves for the repair of various roads, and exacted a T. for the privilege of using the roads so repaired. The popular resistance to these exactions led to the passing of Acts to regulate T. These turnpike roads are now extinct. Where a claim to demand T. is made, there is a distinction between a *toll thorough* (through) and a *toll traverse* (across); the former being granted in consideration of the performance of a continuing beneficial service, such as the repair of a road or the maintenance of a bridge or ferry; the latter, of permitting the general public to pass over the land of the grantee of the toll. Military vehicles are exempt from payment. Other kinds of T. are *port-tolls*, or charges on goods carried into a port; *turn-tolls*, or charges on cattle driven to market and returned unsold, and T. levied by railway companies, as a statutory authority, upon merchandise carried on their lines. In recent years many fine roads in the U.S.A. have been financed by tolls, and it has been suggested that Brit. roads might be financed by the same method. For the Ferries Committee's proposals (*Ferries in Great Britain*, H.M.S.O., 1948), see FERRY. See also ROAD FUND.

Tolly, M. A. Barclay de, see BARCLAY.

Tolna County, see SZÉKESZÁRD.

Tolosa, see TOULOUSE.

Tolpuddle Martyrs, 6 farm labourers of Tolpuddle, 7 m. from Dorchester, who in 1834 were transported to Australia for forming a trade union, which at that time was held to be a conspiracy in restraint of trade. Following a nation-wide agitation, they were pardoned 2 years later. The centenary of the Tolpuddle episode was marked by the pub. of *The Book of the Martyrs of Tolpuddle, 1834-1934*, by the general council of the T.U.C. and of *The Tolpuddle Martyrs*, by M. M. Firth and A. W. Hopkinson; and also by a gift to the public of a plot of land including a memorial to the T. M.

Tolstoy, Count Aleksey Nikolayevich (1833-1910), Russian novelist and playwright, an outstanding representative of National Bolshevism (q.v.). He estab. a name as a Neo-Realist before the 1917 revolution, was with the Whites during the Civil war, emigrated, but then joined the Change of Landmarks movement and in 1923 returned to Russia. At first he was treated by Communists with suspicion as a Fellow Traveller (q.v.), but from the middle 1930s he enjoyed a privileged position as a pillar of Stalinism and directly contributed to the Stalin cult (*Bread*, 1937). His best works are the trilogy *The Road to Calvary*, 1921-41 (trans. 1946) on the life of the Russian intelligentsia in 1914-21, and the historical novel *Peter I*, 1929-45 (incomplete trans. 1936).

Tolstoy, Count Lev Nikolayevich, (1828-1910), great Russian novelist and social reformer, of an old aristocratic family, b. on the family estate Yasnaya Polyana in the Tula prov., where he spent most of his life. He became an orphan at 9 and was brought up by a distant cousin, studied at Kazan Univ., but left it before graduating and gave himself up to pleasure for some years. In 1851 he joined the Russian forces in the Caucasus engaged in the struggle against Shamil (q.v.), and on the outbreak of the Crimea War was at his request transferred to the Danube army and then to Sevastopol', taking part as an artillery officer in its heroic defence.



TOLSTOY IN 1857

When, after the fall of Sevastopol' in 1855, he came to St Petersburg, he was received with admiration in the literary circles of the capital—by Turgenev, Nekrasov, Goncharov, Ostrovskiy, Chernyshevskiy, etc.—as a new star of Russian letters. While in the Caucasus he had written autobiographical stories, *Childhood* and *Boyhood* (pub. 1852 and 1854), and a number of war stories which had already revealed what were to be the main features of T.'s literary work, and his main contributions to the art—the minute psychological analysis and the clarity of moral sense. These first works were followed by the *Tales of Sevastopol'*, 1855, *YOUTH*, the third part of the autobiographical trilogy, 1857, etc. In 1857 and 1860 he travelled widely in W. Europe, bringing back a disgust with its materialism. The second journey was largely devoted to the study of educational methods. In the 1860s and seventies T. devoted much of his time and energy to educational activities, running

a school on his estate, publishing a special magazine, writing textbooks, etc., as one of the pioneers of 'free education.' The sixties and seventies were also the period of most intensive literary work. For over 6 years (1863-9) T. worked on *War and Peace*, often called the greatest novel in world literature, a panorama of Russian society on the eve of and during the Patriotic war of 1812 against Napoleon. Equally forceful and encyclopaedic is the picture of Russia after the emancipation of the serfs (see GREAT REFORMS) in *Anna Karenina*, 1873-7. By the time he finished *Anna Karenina* T. had approached a spiritual crisis, which in the following years was resolved in his working out a new religious and social teaching known as Tolstoyism and based on the conviction that the whole message of Christ was contained in the words 'that ye resist not evil.' Renunciation of violence and wealth, inner self-improvement, and love to all living things are the main tenets of Tolstoyism (*What I Believe In*, 1883, *A Confession*, 1884, *What Are We To Do?*, 1886, *A Short Exposition of the Gospels*). In *What is Art?*, 1896, T. argued that art is a means of 'infecting' other people with the feelings the artist has experienced, and rejected the 'superfluous detail' of his great realistic creations. The imaginative works of T.'s later years (long stories *The Death of Ivan Ilich*, 1884, *Kreutzer Sonata*, 1889, *Master and Man*, 1895, *Hadji-Murad*, 1896-1904; the novel *Resurrection*, 1898-99; the plays *The Power of Darkness*, 1886, *Fruits of Enlightenment*, 1890, and *The Living Corpse*, 1900; and many popular stories) all to a greater or lesser extent serve to illustrate and propagate his new philosophy. His rejection of the Church and State brought him excommunication and government hostility. The fame of his teaching soon crossed the frontiers of Russia, and during the last 15 or 20 years of his life T. was probably the most venerated man in the world. While Yasnaya Polyana became a place of pilgrimage, T. himself felt increasingly estranged from it and from his family, who did not share his views. Unable to reconcile his ideal of simple life with the atmosphere of his family estate, he secretly left Yasnaya Polyana and 10 days later d. of pneumonia at a small railway station. T. the artist has had much influence on subsequent literature. T. the thinker has proved much less influential, and his only great disciple was Gandhi (q.v.). His collected works are being pub. in Russia in 90 vols. (60 have appeared 1928-56). There are many trans. The standard Eng. version is by L. and A. Maude (21 vols.), 1928-37. See also M. Gorky, *Tolstoy, Chekhov, and Andreyev*, 1923; life by A. Maude (2 vols.), 1928; and studies by D. S. Merezhkovskiy, 1902; R. Rolland, Eng. trans. 1911; J. Lavrin, 1924-45; E. J. Simmons, 1946.

Toltecs, semi-legendary people of Mexico and Central America, to whom the Aztecs and Mayas ascribed many cities, monuments, and arts. Though their certain origin is not known, they were the

reputed conquerors of the Mayas. They are said to have migrated southward along the Mexican plateau from the N. In the basin of Mexico they subdued the tribes already settled on the land and founded their own cap., calling the land Anáhuac, 'edge of the water,' on account of its many lakes. It is thought their main centre was at Tula (Tollán). They reached the zenith of their power between AD 700 and 1100, conquering many neighbouring tribes, and in time the confines of their empire extended as far N. as the Tropic of Cancer and as far S. as the S. border of Guatemala. Their name means 'builder,' and they are famous for the great pyramids of Teotihuacán, etc. The legendary Toltec leader, Quetzalcoatl or Kukulcán ('Feathered Serpent'), who is said to have died in AD 895, forced the Maya city states to cease their internecine warfare and accept his rule, but when the power of the T. declined the Mayas resumed their mutual strife, which resulted in their abandonment of the tns of NW. Yucatán. The legendary hist. of Quetzalcoatl is found in *Historia de Colhuacén y de México* (see Scler's *Commentary* (Eng. trans. by A. H. Keane), 1901-02). See also P. James, *Latin America*, 1942.

Tolu, see BALSAM.

Toluca, tn of Mexico, cap. of the state of Mexico, 45 m. SW. of the city of Mexico. It is a summer resort and the centre of an agric. and stock-farming region. The Nevado de Toluca, an extinct volcano (14,950 ft), lies SW. of the tn. To reach T. from Mexico City, a distance of only 40 m. by road, it is necessary to climb above 10,000 ft over the intervening mt range. The centre of the region, known as the basin of T., is swampy; maize, wheat, beans, and alfalfa are grown. Included in this dist. of concentrated settlement is the old mining community of El Oro. There are flour and textile mills and a power plant. Pop. 43,500.

Toluene, Methyl Benzene, or Phenylmethane ($C_6H_5CH_3$), mobile liquid (boiling-point $110^\circ C.$) which resembles benzene in most respects. It is prepared from the 90 per cent benzol obtained from coal-tar and from the cracking of petroleum (q.v.), and is used in the preparation of aniline dyes, explosives, and many other compounds.

Toluidine. The T.s or amino-toluenes ($C_6H_4(CH_3)NH_2$) are prepared from the corresponding *ortho*-, *meta*-, and *para*-nitrotoluenes by reduction. *ortho*- and *meta*-T.s are oils boiling at 197° and $203^\circ C.$ respectively. *para*-T. is crystalline, melts at 45° and boils at $200^\circ C.$ The T.s resemble aniline in their reactions, and they are employed in the manuf. of aniline dyes.

Tom Thumb, see DWARF.

Tomahawk, war-batchet of the N. Amer. Indians. Originally it was composed of a stone head tied to a wooden handle by leather thongs. One end of the stone was sharpened and the other hollowed into a pipe bowl, to which the hollow handle acted as stem. Subsequently steel and iron heads were introduced by Europeans.

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Tomar, tn of Portugal, in Santarém dist., 29 m. NNE. of Santarém (q.v.). It was the seat of the Order of Christ, 14th-16th cents., and it was here that Philip II (q.v.) of Spain was proclaimed King of Portugal. The tn has 2 fine churches and a splendid convent-castle of the Knights Templars (q.v.). Textiles and paper are manuf. Pop. 6400.

Tomato de Vio, see CAJETAN, JACOPO.

Tomaszów Mazowiecki, tn of Poland, in Łódź prov., on the Pilica, 29 m. SE. of Łódź (q.v.). It has iron and textile industries. Pop. 32,000.

Tomato, or *Lycopersicon esculentum*, ann. plant (family Solanaceae), bearing globose red or yellow fruit, formerly known as 'love apples,' was introduced into England in 1596, but only since 1900 has it come into immense popularity in Britain, its production, chiefly under glass, now being a large and important industry. Its production is world-wide. Except in sheltered and especially favoured situations, and when the season is sunny, the culture of the fruit out of doors is unsatisfactory. The plants are raised from seed early in the year in warmth. They are confined to a single stem, shoots at the axils of the leaves being regularly pinched out. Liberal watering and manuring are necessary while the fruit is setting. Lato fruit may be ripened in the dark in a temp. of $50^\circ F.$

Tomb (Gk *tumbos*), properly signifies a mass of masonry raised over a grave or vault used for interment; but it is applied, in a wider sense, to any sepulchral structure. Of primitive sepulchres there are 2 classes, one subterraneous, the other of raised mounds or tumuli. Monuments of the first kind are numerous in Egypt; the Pyramids had no doubt a common origin with the tumulus. At some places in Etruria the T.s are hewn out on the sides of rocks and hills, and their entrances present an architectural façade. Sepulchral edifices are numerous throughout Latium and Magna Graecia, many being remarkable for the architectural decoration bestowed on them. The T.s of the Middle Ages within buildings (churches, chantries, cloisters, etc.) exhibit a variety of form and enrichment, from the primitive stone coffin to the lavishly decorated canopied monuments. Another class consists of *Altar* or *Table Tombs*. The next in order is the *Effigy Tomb*, first introduced in the 13th cent., with a recumbent figure of the deceased upon it, extended, with the hands slightly raised and joined in the attitude of prayer. Altar and effigy T.s were usually placed between the piers of an arch, or within a recess in a wall, and the whole T. was frequently covered by an arch forming a sort of canopy over it; of which kind is that of Aymer de Valence in Westminster Abbey. See also BURIAL CUSTOMS; MASTABA; MAUSOLEUM; PYRAMID; SARCOPHAGUS.

Tombigbee, riv. of U.S.A. rising in Prentiss co., Mississippi, and flowing S. to unite with the Alabama R. to form the Mobile R. Length 400 m.

Tombolo, sandbank or bar connecting an is. to the mainland. A T. is formed

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when deposits of sand formed by wave-action around the is. link with shore deposits of the coast.

Tomis, often but inaccurately called **Toml** (later **Tomiswar**, or **Jegni Pangola**: modern **Kustendje**, or **Constanza**), tn of Thrace on W. shore of the Euxine. Once cap. of Scythia Minor, it was colonised by Greeks from Miletus (c. 600 BC), and is famous as the place to which Ovid was banished.

Tomlinson, Henry Major (1873-1958), novelist and travel writer, b. London. At the age of 12 he became clerk in a shipping company, but disliked the work, and turned to writing. In 1904 he joined the staff of the *Morning Leader*, and in 1912 made a voyage up the Amazon, of which he wrote in *The Sea and the Jungle*. During the First World War he was a war correspondent, then was literary editor of the *Nation* from 1917 to 1923. After travelling in the East Indies he wrote *Tidemarks*, 1924. His novel *Gallions Reach*, 1927, was awarded the Femina-Vie Heureuse Prize; others are *All Our Yesterdays*, 1930, *The Snows on Helicon*, 1933, *All Hands*, 1937, and *Morning Light*, 1946. But he is best known for his travel books, *Old Junk*, 1918, *London River*, 1921, *Under the Red Ensign*, 1926, *Out of Soundings*, 1931, *The Wind is Rising*, 1941, *Turn of the Tide*, 1945, and *Malay Waters*, 1950. *A Mingled Yarn*, 1953, is a book of autobiographical essays.

Tommaso di Stefano, see **GIOTTINO**.

Tommy Atkins, slang name for the Brit. private soldier; more shortly 'Tommy', as in the opening poem of Kipling's *Barrack Room Ballads*, 1892. Originally the supposititious name used in a specimen form in an official handbook issued by the War Office after the Napoleonic wars and afterwards generally applied to describe the Brit. regular soldier. The vogue of the name, which is used in a friendly rather than in any derogatory sense, was due largely to Kipling. There seems to be no convincing evidence that the name was that of an identifiable individual, though the theory has been advanced that a soldier of that name was mortally wounded under Wellington when a subaltern in Holland, and that many years later the Duke, when secretary of state, adopted the name in the army form. The Scots equivalent is 'Jock'.

'**Tommy Gun**,' see **SUBMACHINE GUN**.

Tomplon, Thomas (1638-1713), watchmaker, b. Northill, Beds. Throughout his career he was closely associated with some of the leading mathematicians and philosophers of the time. The theories of Robert Hooke (q.v.) and Edward Barlow (see **CLOCK**) would, in all probability, never have been put into practice but for Tomplon's skilful execution of them. Early in his career he became the leading watchmaker to the court of King Charles II, and was everywhere welcomed as a craftsman of exceptional ability. T. was closely associated with the Worshipful Company of Clockmakers, being elected a brother in 1671, a Freeman in 1674, and Master in 1704. He is buried in Westminster Abbey. See **WATCH**.

Tomsk: 1. Oblast in W. Siberia, traversed by R. Ob', largely covered by swampy coniferous forests. Area 121,400 sq. m.; pop. (1958) 751,000, mostly Russians, some Tatars and Khanty. There are lumbering and wood-processing, metalworking and food industries, fur trapping, grain and flax growing, and dairy farming. Area of banishment and labour camps (see **NARYM**).

2. Cap. and econ. centre of the above, and a major cultural centre of Siberia. There are engineering, chemical, and woodworking industries. It has a univ. (oldest in Siberia, founded 1888) and a polytechnical institute (founded 1900). Pop. (1956) 224,000 (c. 1914, 112,000; 1926, 92,000; 1939, 141,000). T. was founded in 1604 as a fort. tn, and played an important part in further Russian advance in Siberia as a trade and transportation centre on the crossing of water and overland ways; it was a prov. cap. 1782-1925, and the admin. centre of a gold-mining area from the 1830s; industrial development has taken place since the 1930s, and particularly since the Second World War.

Tomtit, see **TIT**.

Ton, or **Tun**, see **METROLOGY**.

Tonalite, type of quartz diorite found in the Adamello Alps. Plagioclase quartz, hornblende, and biotite are dominant minerals, with magnetite, zircon, etc., as accessories. The granite-diorites of the U.S.A. are of this type, which is also found among the Scottish plutonic rocks.

Tonality, synonym for **key**, in music, but also meaning, more specifically, the feeling of a definite key suggested by a composition or passage. In modern musical terminology 2 antithetical derivatives of the word have appeared, **atonality** (q.v.), and **polytonality** (q.v.).

Tonawanda, tn of New York, U.S.A., in Erie co., on the Erie Canal. It has canal and lake shipping, and is also a commercial and railroad centre. It manufs. chemicals, hardware, paper and metal products, furniture, office equipment, lenses, and paints, and there is oil refining. T. Indian reservation is E. Pop. (1950) 14,617.

Tonbridge, tn of Kent, England, on the R. Medway, 27 m. SE. of London, an agric. mkt. and educational centre. Printing, manuf. of cricket balls, bricks, plastic goods and flints, tanning, and tanneries are the chief industries. Remains of T. Castle, founded soon after the Norman Conquest, are to be seen. T. School was founded in 1553 by Sir Andrew Judd, who placed it in the care of the Skinners' Company. Little of the 16th-cent. building remains; new additions were completed in 1894. Jane Austen's father, the Rev. George Austen, was a master here. See D. C. Somervell, *A History of Tonbridge School*, 1947. Pop. 20,000.

Tønder: 1. Amt in S.W. Jutland, Denmark. The soil is mainly marshy, but there is some agriculture. From 1864 until the plebiscite of 1920 the dist. was part of Germany. Area 535 sq. m.; pop. 42,840.

2. Cap. of the above, near the Ger. border. Pop. 7250.

Tone, Theobald Wolfe (1763-98), Irish patriot, b. Dublin, and educ. at Trinity College there. He was called to the Irish Bar in 1789, but devoted himself to politics, and printed articles attacking the gov. In 1791 he founded the society of United Irishmen (q.v.), and in the same year was elected secretary to the Catholic Committee. He went to the U.S.A. in 1795, and in the following year went to Paris, where he persuaded the Directory to organise a Fr. invasion of Ireland. T. was given a command under Hoche (q.v.) in the resultant expedition, but the French failed to effect a landing. In 1798 T. was captured (by the forces of Sir John Warren) on board a Fr. ship which was part of a force intended to support the Irish risings of that year. He was tried by court martial and sentenced to death for treason; he committed suicide in prison. His *Autobiography* was pub. in 1826. See lives by A. de Blacam, 1935, and G. F. MacDermot, 1939.

Tone, term used in English for pure musical notes not charged with harmonics, each harmonic being itself a T.; also for the quality of a musical sound, especially with reference to performance. The word T. does not imply pitch; but in America it is often used confusingly as synonymous with 'note,' doubtless under the influence of the Ger. *Ton*.

Tones, Partial, see HARMONICS.

Tonga, or Friendly Islands, kingdom under Brit. protection situated in the W. Pacific to the ESE. of Fiji between 15° and 23° S. lat., with an area of 259 sq. m. The group consists of about 200, mostly small is., 36 of which are inhabited. They were discovered by Tasman in 1643, and visited in 1777 by Cook, who, on account of the disposition of the natives, called them the Friendly Is. Most of the is. are of coral formation, though some (Tofua, Kao, and Niuafuon) are volcanic. There are 2 volcanoes, and the is. are subject to frequent hurricanes. The Tongans are Polynesians, closely allied to the Maoris and Samoans. Tonga is a constitutional monarchy under the protection of Great Britain, estab. by a treaty of friendship and protection signed in 1900. The is. are ruled by Queen Salote Tupou, G.C.V.O., G.B.E., who succeeded her father, King George Tupou II in 1918. The kingdom consists of 3 main groups of is., Tongatabu, Ha'apai, and Vava'u. The inhab. are converted to Christianity, the first Wesleyan missionaries having landed in Tonga in 1826. Free Wesleyan Church 28,500; Free Church of Tonga 9000; Rom. Catholic 7500; other Protestants 7000. There are both gov. and mission primary schools, education being compulsory between the ages of 6 and 14. Schools are divided into 3 types, primary, middle, and high. There are 3 public hospitals, the main one being at Nuku'alofa (the cap.). The soil is very fertile, and the chief exports are copra and bananas; other exports are sweet potatoes, pineapples, melons, and candle-nuts. All copra is now shipped to

the U.K. and bananas to New Zealand. The imports include drapery, flour, sugar, timber, and hardware. Exports were valued at £1,202,162 in 1953 and imports at £918,319. There is no public debt, and the amount of accumulated balances (30 June 1953) was £699,508. The main source of revenue is customs duties. There is a monthly steamship service from New Zealand via Fiji, and vessels call at frequent intervals to load copra for the U.K. New Zealand National Airways ceased operating to Tongatabu in 1950, as T. felt that the heavy cost of maintaining airfield facilities was unwarranted.



TONGAN BOY

E.N.A.

In 1953 Tonga made arrangements with Tasman Empire Airways Ltd., which replaced New Zealand National Airways Corporation's land-plane service with a Solent flying-boat service, to fly charter-trips from Suva and return. Since 1954, flights have been made at alternate 2-weekly and 6-weekly intervals. There are 5 wireless stations in the group and a telephone service in Nuku'alofa and in Vava'u. The constitution provides for a gov. consisting of the sovereign, a privy council and cabinet, a legislative assembly, and the judiciary. The sovereign presides over the privy council, which consists of the premier, the ministers (at present 3 Tongans and 1 European, who are also heads of gov. depts) and the governors of Vava'u and Ha'apai. The constitution of the cabinet is similar, except that the premier presides. The legislative assembly consists of the premier, and ministers of the Crown (including the 2 governors), 7 representatives of the nobles elected by the nobles themselves, and 7 representatives of the people elected triennially by popular franchise.

The courts consist of a supreme court, a magistrate's court, and a land court. Pop. (1953) 51,403 Tongans, 230 Europeans, and 945 others.

History. The first Europeans to visit any part of the group were the Dutchmen Cornelis Schouten and Jacob le Maire in 1816. After Tasman, the next arrival was the first Englishman to land in T., Capt. Wallis, who, in 1767, gave the name of Keppel to the N. is. of Niuatobutabu and exchanged some iron nails with the natives for food. A few years later these

the kingdom, given the people a land system, a constitution, and the beginnings of parl. gov. in a modern Christian state. The result of Brit. protection, however, has been to sustain and strengthen the Tongan's independence and national characteristics. The Tongans have their own currency notes and postage stamps, and the language of the gov. or the depts is Tongan. Foreign affairs are transacted through the Brit. agent and consul, who is appointed by the gov. of Fiji and acts as adviser to the queen and gov. His



A TONGAN DANCE

nails were shown by the natives to Cook, who paid sev. visits to the group between 1773 and 1777 and gave a full account of the is. and people on his return home. After Cook's time Tonga began to be torn by civil wars between sev. contemporary dynasties, from which it was rescued, after long and heavy fighting, by a member of the 19th Tui Kanokubolu (or third dynasty), Taufa'ahau Tupou, an able warrior and administrator who had been converted to Christianity in 1831, when he and his wife, at their baptism, took the names of George and Salote (Polynesian for Charlotte) in honour of George III and his consort, and these names have persisted in the Tupou dynasty to this day. By 1845 King George Tupou I had brought the whole of Tonga under his rule and when he d. in 1893, at the age of 96, he had united

consent is necessary for the appointment of Europeans to the Tongan gov. service. In other respects the country is completely autonomous. See Sir H. Luke, *Britain and the South Seas*, 1945.

Tongaland, see AMATONGALAND.

Tongareva, see PENRHYN.

Tongariro, volcanic mts in the N. part of the N. Is. of New Zealand, Wellington prov., 20 m. SSW. of Lake Taupo. The N. plateau, to which the name is confined, has 8 craters. To the S. is Ngauruhoe (7315 ft), which was in eruption in Mar. 1909. The Red Crater and Te Mari are also still active.

Tongatabu, prin. is. of Tonga.

Tongeren (Fr. Tongres), tn in the prov. of Limbourg, Belgium, 12 m. SE. of Hasselt, generally considered to be the oldest tn of Belgium. It was called Civitas Tongrorum under the Romans.

Part of the defensive wall, built in this last period, has been laid bare recently. Among its numerous historical monuments are the 15th-cent. basilican church of Notre-Dame, the cloister of the 12th cent., the beguinage and the Moerepoort, an interesting remnant of the fortifications of the 14th cent. T. has an important cattle mkt. Pop. 15,000.

Tongres, see TONGEREN.

Tongue, vil. on the N. coast of Sutherland, Scotland, on the E. shore of the Kyle of T. The House of T., first erected 1678, is a seat of the Duke of Sutherland. To the W. of the Kyle are the impressive cliffs of Kennageall or Whiten Head. Pop. 827.

Tongue, movable muscular organ attached to the floor of the mouth, and concerned in the operations of mastication, deglutition, speaking, and tasting. The T. consists of a mass of muscle symmetrically arranged about a middle line from tip to roof. The base is attached to the hyoid bone; the upper surface, or dorsum, is free; the edges and the anterior portion of the lower surface are free. A fold of the investing mucous membrane is situated in the middle line of the under surface; this is the *frænum lingue*, or 'bridle' of the T. The substance of the T. is striped muscle. It is supplied by branches of the lingual artery, whose origin is the external carotid. The nerves of the T. are the gustatory, for touch and taste sensations, the glossopharyngeal, supplying the posterior third, and the hypoglossal, which conveys motor stimuli. The surface of the T. is covered with squamous epithelium and is supplied with numerous papillæ (see TASTE). The T. is liable to morbid changes. The easily-recognised phenomena of furring may indicate dyspepsia or inflammatory conditions of the upper respiratory tract. Acute inflammation, known as glossitis, may occur from bacterial infection or contact with strong irritants. Chronic inflammation is due to prolonged irritation, as by a broken tooth or excessive smoking, and may also occur in secondary syphilis (q.v.). It may be followed by excessive growth of the surface cells leading to the formation of a cancer (q.v.).

Tonic, in medicine, an agent which tends to re-establish the proper performance of the functions of the body in general, or of some particular organ. T.s differ from stimulants in that the latter produce a transient effect rapidly, while the former gradually build up a permanent effect. Among general T.s are vegetable bitters, cold baths, exercise, etc.; iron and arsenic are blood T.s; dilute acids are gastric T.s; digitalis and strophanthus are cardiac T.s.

Tonic, in music, the fundamental keynote of a scale. See MUSIC.

Tonic Sol-fa, see under SOLMISATION.

Tonic Sol-fa College, see under CURWEN, JOHN.

Tonka, or **Tonquin Bean**, see DIPTERYX.

Tonking: 1. Northernmost of the 3 administrative divs. into which France split Viet Nam during the 19th cent., and now forming part of the Democratic Rep.

of Viet Nam (see VIETNAM, DEMOCRATIC REPUBLIC OF). It is bounded N. by the Chinese provs. Kwangtung, Kwangsi, and Yunnan; E. by the Gulf of T.; W. by Laos; and S. by Annam. The prin. riv. is the Red R. (q.v.) which flows from NW. to SE. The mountainous plateau and forest land lies chiefly N. and W., and there is flat, low-lying, fertile land to the SE. Area 40,530 sq. m. There are a number of small is. off the coast. Gold, silver (at Ngan-son), antimony, tin, and coal (Quang-yen prov.) are found, and there are rich limestone quarries and calomine mines. Teak, ebony, and sandalwood are the most valuable woods produced. In the low-lying delta areas of the SE. rice is grown very extensively and is the main crop. In other parts are plantations of coffee, tobacco, maize, arrowroot, tea, cotton, jute, sugar-cane, as well as mulberry and some other fruits. The litchi (detchi, or leeches) tree is a native of T. Vegetables, betel palms, areca nuts, bamboo, hemp, indigo, gambodge, pepper, and cinnamon are also grown. High-quality silk is produced and woven for home consumption. Sea-fishing is practised, and a fish-canning factory was recently opened. Handicrafts include the weaving of reed mats and baskets, lacquer-work, and inlaying with mother-of-pearl. There is, at present, little export trade, since all European and almost all Vietnamese and Chinese commercial companies have ceased to operate in T. since the Communist gov. assumed control in 1955 (see VIET NAM). No new trade pattern has yet emerged, and all importing and exporting is in the hands of the gov. Hanoi (q.v.) is the cap. of T., and Haiphong (q.v.) the main port. There are large cotton mills in Nam-dinh (q.v.) which have now resumed production. Much of the railway system was destroyed during the 1945-54 war, but some lines are again in operation. Hanoi and Haiphong are now connected by rail to one another as well as to S. China. T. formed part of the kingdom of Viet Nam until the Fr. protectorate was estab. in 1884. During the Second World War it was occupied by Japan, and in 1945 experienced a severe famine which caused over 1,000,000 deaths, owing to the bad harvest and the excessive requisitioning of rice by the Japanese. Occupied by Chinese troops after the Jap. surrender, T. became the scene of political battles between the returning French and the Viet Minh (q.v.). Full-scale war broke out in 1946 at Hanoi, and T. continued to be the scene of the heaviest fighting throughout. The final, and most destructive, battle was fought at Dien-bien-phu (q.v.) in western T. In 1955 the Viet Minh assumed control of all T. and N. Annam (q.v.), which they estab. as the Democratic Rep. of Viet Nam. See C. Madrolle, 'Le Tonkin Ancien,' *Bulletin de l'Ecole Française d'Extrême Orient*, vol. xxxviii, 1937, and *Indochine du Nord*, 1925; P. Gourou, *Les Paysans du Delta Tonkinois*, 1936; E. Hammer, *The Struggle for Indo-China*, 1954, with

supplement *The Struggle for Indo-China Continues*, 1955; G. Taboulet, *La Geste Française en Indochine* (2 vols.), 1955-6; Lê Thanh Khôi, *Histoire du Viet Nam*, 1955.

2. Gulf of, an arm of the China Sea, of average breadth 150 m. receiving the Red R. (q.v.). It is bounded by T., Kwangtung, and Hainan.

Tonks, Henry (1862-1937), artist, b. Solihull, Warwickshire. Educ. at Clifton, he studied for the medical profession at London Hospital, becoming F.R.C.S. He abandoned medicine, however, and devoted himself to painting and teaching art. In 1917 he became Slade Professor of Fine Art in the Univ. of London, and he exercised strong influence on teaching at the Slade School. 'An Evening in the Vale', 1929 (Tate Gallery) is his best-known work. See life by J. Hone, 1939.

Tonlé-Sap, large tidal lake in NW. Cambodia (q.v.) fed by R. Mekong (q.v.). It is the centre of Cambodia's fishing industry and the source of irrigation for a large part of NW. Cambodia.

Tonnage of a ship is the measure of its cubical or carrying capacity expressed in tons. There are now in use 4 methods of expressing the T. of a ship, known respectively as the gross T., the net register T., the dead-weight T., and displacement T. Before 1836 (1812 for warships) there was in use a much rougher and more inadequate measure, the 'builders old measurement' (B.O.M.), which, however, is still sometimes referred to. In calculating the gross T., the whole interior capacity of the ship below the T. deck is found, together with that of all covered-in spaces on deck used for stowage, and the result in cub. ft. is divided by 100. T. deck is the upper deck in all ships which have fewer than 3 complete decks; and is the second deck from below in all other ships. A 'register' ton is a measurement of space calculated from the average bulk of light freight. The net register T. is the gross T. minus all those spaces used for the working parts of the ship or for the accommodation of crew or instruments. It is on this T. that dues are almost invariably paid. The dead-weight T. is the measure of the exact amount of cargo, bunkers, stores, etc., that a ship can carry when floating at her load draught. The displacement T. is that in use since 1872 for all ships of war throughout Europe. The amount of water displaced by a ship is, of course, equal in weight to the ship and all that it contains. Since 35 cub. ft. of water weigh 1 ton, the displacement T. is found by dividing by 35 the number of cub. ft. of water displaced when the ship is immersed to its draught- or load-line.

Tonnage and Poundage. Tonnage, a tax from 1s. 6d. to 3s. levied on each tun of wine or liquor imported into or exported from the U.K., and poundage, a similar tax of 6d. to 1s. on every lb. of dry goods, were first levied in 1371. James I. asserted his right to alter the rates of levy as he chose by means of additions called *Impositions*, and secured a decision in his

favour on the legality of such additions against the merchant Bate. Parliament never ceased to protest against this denial of its claim to control taxation, and the resistance of Hampden to the collection of the tax expressed the widespread discontent over the question which contributed much to the outbreak of the Civil war. In 1660 it was granted to Charles II, made perpetual under Anne, and abolished, on the reorganisation of customs and excise in 1787.

Tonnage Dues, rates levied on the tonnage of ships entering ports or navigable public waters. Such rates are imposed by local Acts; and the mode of computing tonnage for the purposes of the dues may be that set out in the particular local Act, or may, with the consent of the Ministry of Transport, be on the registered tonnage as ascertained according to the rules made under the Merchant Shipping Act, 1894. The dues are devoted to the upkeep of harbours, wharves, etc., and the maintenance of buoys, lighthouses, and light vessels. Pilotage dues are often paid on tonnage, and all ships passing through the Suez, Panama, and other canals pay tonnage dues. By the constitution of the U.S.A. no state may impose T. D. without the consent of Congress; but a municipal corporation may levy a wharfage rate on the owners of unused steamboats mooring at a wharf.

Tonnerre, Fr. tn in the dept of Yonne, on the Armançon. A picturesque tn, it has a wine trade. Pop. 4200.

Tonquin Bean, see DIPTERYX.

Tönsberg, fort. seaport of Jarlsberg-Laurvik amt, Norway, near the Christiania Fjord. It is one of the oldest tns in Norway (AD 871), and is the H.Q. of the sealing and whaling fleet. Near here are the ruins of an anc. fortress and royal residence. Pop. 11,900.

Tonsils, pair of almond-shaped bodies situated in the fossa between the pillars of the fauces in the pharyngeal cavity. Each consists of a mass of lymphoid tissue plentifully supplied with blood vessels, and is covered with mucous membrane which dips into depressions called crypts. The T. secrete a viscous fluid which acts as a lubricant to the respiratory passages, but their main function is to filter off pathogenic bacteria from the lymph flow which drains into them from the mouth and pharynx. Thus it is that the T. are a frequent site of inflammation from septic infection. Tonsillitis, as this inflammation is called, may be acute or chronic. Acute tonsillitis is most often due to infection with the streptococcus, and may be the starting point of generalised streptococcal infections such as rheumatic fever (q.v.) and scarlet fever (q.v.). Bovine tuberculosis infection (see TUBERCULOSIS) may also gain access to the system through the T. The treatment of acute tonsillitis consists in the administration of the appropriate sulphonamide or antibiotic, but mild cases dissolve in a few days without specific treatment. Chronic tonsillitis, as its name implies, is a state of chronic inflammation resulting from one

or more attacks of acute tonsillitis. It is invariably accompanied by overgrowth of the adenoidal tissue in the nasal pharynx. The treatment is usually surgical removal of the tonsils and adenoids. *Quinsy* is the term given to an acute suppurative tonsillitis with abscess formation in and around the T.

Tonson, Jacob (c. 1656-1736), publisher. He was apprenticed to a stationer and having been admitted a freeman of the Stationers' Company in 1677, began business on his own account. T. purchased Dryden's *Troilus and Cressida* in 1679, and in 1681 acquired the valuable property of a half-share in the rights of *Paradise Lost*, of which he bought the other half in 1690. He was secretary of the Kit-Kat club, and became associated as publisher with the prin. men of letters of his day, including Steele, Pope, Addison, Congreve, and Wycherley. He was printer of parl. votes. He retired from the business about 1720, and his descendants carried on the business. See BOOKSELLING.

Tonsure, the cutting of the hair in a certain form as a symbol of self-dedication to the monastic life. The custom first appears at the end of the 4th or beginning of the 5th cent. In the anct Celtic Church all the front of the head was shaved in front of a line drawn from ear to ear. In the Oriental churches the whole head is shaved. In the Rom. Church the 'coronal of St Peter' has always been used. In this T. the crown of the head is shaved to leave a fringe of hair all round.

Tontine, form of mutual life insurance in which a number of people invest a sum of money in the purchase of a property. They share the income, and as each dies the shares become proportionately larger per survivor, until all the property eventually devolves on one. It owes its name to an It. banker, Lorenzo Tonti, whose idea it was. In France and in Great Britain, in the 18th cent., the State raised money by this means.

Tooke, John Horne (1736-1812), politician and philologist, b. London and educ. at Westminster, Eton, and St John's College, Cambridge. He was ordained in 1759, but resigned his living in 1773. He at first supported Wilkes, but quarrelled with him in 1771. His support for the Amer. colonists and for the Fr. Revolution brought him political notoriety; in 1801 he was elected to Parliament, but immediately after this an Act excluding the Anglican clergy from membership was passed (this Act is still in force), which disqualified him. He wrote an important work on philology: *Epea Pterocenta*, or the *Diversions of Purley*, 1786-1805. See life by M. C. Yarborough, 1927.

Toole, John Lawrence (1832-1906), actor, b. London, educ. at the City of London School. In 1879 he took a lease of the Folly Theatre, changing its name to 'Toole's Theatre.' Characterised often as 'the last great low comedian of the old school,' T. excelled, nevertheless, in serio-comic parts. See his *Reminiscences*, chronicled by Joseph Hutton, 1888.

Tools, Machines. The most important machine for producing finished work with T.s is the *lathe* (q.v.). Since the invention of the slide-rest during the last cent. it has been possible to turn out very accurate work, since this affords a rigid support for the T. being used and can traverse it parallel to the piece that is being worked. The *planing machine*, invented by Clement about 1825, is used for producing a truly level surface. The work moves under stationary T.s on a rolling bed. In the case of very heavy objects, such as armour for battleships, the machines have a fixed bed and movable T.s. Planing is being gradually superseded by *milling* (see MILLING MACHINES). *Drilling Machines* sometimes have sev. spindles worked at once, if it is necessary to drill a great many holes in a plate, such as a boiler firebox. Adaptors are also made for fitting taps into small drilling machines so that it is possible to tap small holes by this machine. *Shaping machines* are planers on a small scale with moving T.s; the T. is moved by means of a crank and connecting-rod; it is used on light work. *Boring mills* may be either horizontal or vertical; they are largely used for cylinders and guns, etc. Cylinders 12 ft in diameter may be bored on these machines, while holes 15 or 16 in. in diameter can be bored for some 60 ft in length. See E. Pull and F. J. Taylor, *Workshop Practice*, 1935; W. H. Atherton *Workshop Practice*, 1942; P. Gates, *Jigs, Tools, and Fixtures*, 1944.

Toombs, Robert (1810-85), Amer. statesman, b. Georgia and educ. at the univs. of Georgia and Virginia. After a number of terms in the House of Representatives of his state he was a Congressman from Georgia from 1845 to 1853, and U.S. Senator from Georgia from 1853 to 1861. When the S. Confederacy was formed and Jefferson Davis was named President, the latter appointed a Cabinet whose only strong men were T. as secretary of state and Judah P. Benjamin as attorney-general. When the grave question of attacking Fort Sumter, at the entrance to the harbour of Charleston, S. Carolina, was discussed, T. counselled caution, but was overruled. Later he quarrelled with Davis and left the Cabinet to become inspector-general of the Georgia troops. When the war was lost he remained in exile in Europe until 1867. He then returned to his native state, where he practised law until his death.

Toothwort (*Lathraea*), genus of plants (family Orobanchaceae), partly parasitic and partly saprophytic. *L. squamaria*, the only Brit. species, has a fleshy branched rhizome clothed with tooth-like scales and bearing a raceme of drooping dull red flowers, parasitic on hazel, beech, and woody plants. *L. clandestina*, introduced from W. Europe, is parasitic on willows and poplars.

Tooting, dist. of the bor. of Wandsworth, SW. London, largely residential. Dr Johnson used to visit his friend Mrs Thrale at Thrale Place, the site of which

is now covered by Streatham Park. T. was once famed for its inns. Pop. 38,200.

Toowoomba, second largest city in Queensland, Australia, in the centre of the rich Darling Downs, 101 m. W. of Brisbane. It serves vast farming and dairying areas, where meat and wool are produced extensively. Pop. 44,000.

Toparé, see POLONNARUWA.

Topaz, mineral crystallising in the orthorhombic system, with cleavage parallel to basal face, a fluosilicate of aluminium of $Al_2(F,OH)_2SiO_4$. The colour range includes colourless, yellow (pale to brown), blue, pale green. Hardness 8, sp. gr. 3.5. The pink T. seen in jewellery is produced by heating brownish-yellow stones which change colour on cooling. On heating or rubbing, T. becomes electrified (pyro-electric). T. is abundantly found in Brazil, Siberia, Ceylon, Mexico, Japan, and Tasmania; in the Brit. Is., in the Cairngorm Mts in Scotland, Mourne Mts in Ireland, and in Cornwall. The true T. should not be confused with the yellow quartz known as citrine (hardness 7, sp. gr. 2.65). There is also the yellow sapphire, sometimes sold as Oriental T.

Topé (Hind. *tōp*. prob. from Pali *thūpa*, Sanskrit *stūpa*, a mound), common name for a kind of Buddhist monument erected by monks to enshrine relics of Buddha or his disciples. Most T.s take the form of a tumulus of masonry, shaped like a dome or tower, and often surrounded by an elaborately carved stone railing with lofty gates far higher than the railings. When the purpose of the T.s is for the preservation of relics, it is called a *dagoba* (see PAGODA), and when its purpose is merely to commemorate some event, the usual name is *stupa*, the word T. only connoting the external shape. There are numerous specimens in India, and SE. Asia, and it is assumed by archaeologists that they were all constructed between 200 BC and AD 400. The most antc are dome-shaped and are built on a cylindrical or polygonal base which rises in terraces. The most noteworthy is at Sānci in Bhopal, but the ruins in the vil. of Amravati in the Kistna dist. of Madras are those of the finest Buddhist monument in India. One of the largest of those which are raised on terraces is that at Manikyāla near Rawal Pindi in the Punjab, and all T.s in the Punjab are, as this one, plain hemispheres in form. A peculiar feature of the T. is the structure at the cone or apex, which is shaped like an open umbrella and called the *tee*, but generally there is now only a flat space at the apex where once the *tee* stood.

Topeka, cap. of Kansas, U.S.A., and co. seat of Shawnee co., on the Kansas R., 55 m. W. of Kansas City. It is a large manufacturing centre, and has railway workshops, publishing, printing, and wholesale houses, and insurance firms. It also has flour milling, meat packing, and dairying, and manufs. foundry products, tyres, tents, awnings, clothing, and medicine. It is the third largest city in the state. Pop. 78,790.

Topellius, Zachris (1818-98), Finnish novelist and poet, b. Kuddnaes. He entered journalism and for 20 years ed. a newspaper in Helsingfors. In 1864 he was appointed Prof. Extraordinary of the Finnish Language at the univ. in Helsingfors and 7 years later Prof.-in-Ordinary of Finnish, Russian, and N. Hist. He was the author of sev. vols. of descriptive and lyrical poems, but his fame rests on a series of historical novels, grouped under the title of *Fälleskärns Berättelser* (The Surgeon's Stories), 1859-67, describing Finnish life over 3 cents. The first cycle, *Gustave Adolf and the Thirty Years War*, was trans. into Eng. and pub. in New York in 1872, and in London in 1901 with the title of *The King's Ring*. The remaining 5 cycles were pub. in Eng. trans. in Chicago in 1883-4. Following the manner of Scott, their historical background is well described and the stories finely imagined. T. also compiled a notable collection of children's stories. *Läsning för Barn*, (Eng. trans. *Fairy Tales from Finland*) (4 vols.), 1865-96, which made him the Hans Andersen of Finland. T. wrote in Swedish. See lives by E. Spjut, 1919, and S. Lagerlöf, 1921; and V. Vasenius, *Topellius Hans Lif och Skaldegärning*, 1912.

Tophane, see ISTANBUL.

Tophet(h), 'fire-place,' S. of Jerusalem, at the junction of the valley of the Sons of Hinnom (Ge-bene-Hinnom, Jer. xix. 2, —shortened to Ge-Hinnom, 2 Kings xxiii. 10), the modern Wady er-Itababi, and the Kidron valley. Child sacrifices were offered there to Moloch (Milkom) god of the Ammonites, whose worship Solomon introduced (1 Kings xi. 7). Ahaz offered up his son there (2 Kings xvi. 3), and the practice was common later (Jer. vii. 31). The evil place was later defiled and made the refuse dump of the city, providing, with its smouldering rubbish and maggots, the symbolism for Gehenna, or Hell (Mark ix. 45 f.).

Topiary, training and clipping of trees and shrubs into ornamental shapes. The art was most greatly developed in Tudor times, and was a definite feature of old-world gardens: some of the more ambitious examples still exist at Elvaston Castle, Derby, and Leven's Hall, Westmorland. Evergreens are most popular for T. work, though hawthorn stands up to clipping well and is often used. The 2 best species, being long-lived and able to withstand severe, and constant clipping, are yew (*Taxus baccata*) and box (*Buxus sempervirens*). Holly (*Ilex aquifolium* and its variegated varieties) and evergreen oak (*Quercus ilex*) are often used, and the larger-leaved sweet bay (*Laurus nobilis*) and Portugal laurel (*Prunus lusitanica*) may be trained in simple, formal shapes.

Toplady, Augustus Montague (1740-78), Anglican divine and hymn-writer, b. Farnham, Surrey, and educ. at Westminster and Trinity College, Dublin. He entered the Church in 1762, and became vicar of Harpford (1768) and Broad Hembury (1768). In 1775 he became minister at the Fr. Calvinist Chapel in

London. He is remembered for his hymn, 'Rock of Ages.' See life by T. Wright, 1911.

Topographic Surveying, see AZIMUTH; LATITUDE AND LONGITUDE; THEODOLITE; TRANSIT INSTRUMENT. See also SURVEYING AND LEVELLING.

Topography, see MAPS; MAP READING.

Topolias, see COPAIS.

Topsail, see SAILS AND RIGGING.

Tor Bay, on the S. of Devon, England, was the landing place of William of Orange (1688). On its shores are the tns of Torquay, Paignton, and Brixham.

Torbanite, see BOGHEAD COAL.

Torch-thistle, see CEREUR.

Tordesillas y Herrera, Antonio de, see HERRERA Y TORDESILLAS, ANTONIO DE.

Tore, see PYGMIES.

Torfason, Thormóður (1636-1719), Icelandic scholar, better known under his Latinised name **Torfaeus**. In 1660 he entered the service of the King of Denmark, Frederik III, and became *antiquarius regius*. In 1666 he married a Norwegian lady of property, thenceforth residing on his estate in Norway (then a Dan. province), and wrote on Scandinavian medieval hist., basing his writings on Old Icelandic sources. His works are still valuable because the original sources no longer exist, e.g. *Historia rerum Norvegiarum* (4 vols. fol.), 1711, and *Orcaeas* (i.e. Hist. Orcadum), 1697.

Torga, Miguel (1907-), pseudonym of the Portuguese poet, novelist, dramatist, and short-story writer Adolfo Rocha, an independent and staunch individualist among literary circles. He pursues a long-drawn speculation on the relationship between the material and the spiritual, mingling a deep sensuousness with an all-embracing love for every living form in the universe. His works include *Crição do Mundo* (3 vols.), 1937-8, *Bichos*, 1940, *Didrio*, 1941-9, *Mar*, 1941, and *Sinfonia*, 1947.

Torgau, Ger. tn in the dist. of Leipzig, on the Elbe (q.v.), 30 m. NE. of Leipzig (q.v.). In 1526 the T. League (of Protestant princes) was formed here, and in 1631, during the Thirty Years' War (q.v.), a council of war of Protestant commanders was held here under Gustavus Adolphus. Frederick the Great defeated the Austrians near by in 1760. During the Second World War it was the scene of the first allied link-up, when Amer. patrols met units of the 58th Russian Guards' Div., on 25 April 1945. There is a Gothic church containing the grave of Luther's (q.v.) wife. Chemicals and machinery are manufactured. Pop. 20,000.

Torhout (Fr. Thourhout), tn in the prov. of W. Flanders, Belgium, 12 m. SSW. of Bruges. 2 m. NW. of T. lies the beautiful castle of Wijpendale, built in the 11th cent. In 1940 King Leopold III had his H.Q. and capitulated here on 28 May. T. is considered to be the oldest place in Flanders and was once the most important cloth-mrkt of the country. Manufs. include linen, drainage pipes, and weighing-machines. It is an important horse-mrkt. Pop. 12,800.

Torino, see TURIN.

Tormentil (*Potentilla erecta*), perennial herb (family Rosaceae), found in the Azores, W. Siberia, and Europe. The leaves are divided into 3, sometimes 5, leaflets; the flowers, which are yellow have 4, sometimes 5, petals. The root-stock is used in tanning, having an astringent quality.

Tornado, cyclonic disturbance of the atmosphere, most common in the U.S.A. E. of 100° W. long., but particularly in Kansas and Illinois. Usually it arises suddenly on a sultry summer afternoon in the transition zone, between tropical maritime air from the Gulf of Mexico and polar air that has become hot and dry over deserts. It is of small diameter, a few hundred yds, but of relatively great vertical height. The upper portion is marked by a swirling funnel-shaped cloud which sways and rises and falls and may reach the ground in the centre of the T. Local surface conditions give rise to rapid heating of a column of moist air by the sun, and sudden expansion takes place; it rises, and condensing moisture adds to its temp. As it spreads out rain falls, which evaporates into surrounding dry air, cooling it and increasing the instability of the transition zone, causing, in its turn, more intense convection—a self-generating process.

The pressure in the centre falls and as the air is sucked in, it is whirled vortex-like in a cyclonic (anti-clockwise) rotation with stronger and stronger winds, sometimes reaching 300 m.p.h. The force developed cuts a clean path through tn or country; trees are uprooted and whirled outside the track: houses are 'burst' by their own internal pressure as the low pressure passes; the damage to houses often leads to escape of gas and disastrous fires. The track extends usually for a few miles, and the energy is dissipated in about an hr, although sev. have been observed at the same time. They also occur in India, where they are sometimes known as 'Nor'westers,' and in Australia, where the name is 'Willy-willy.' A very destructive T. visited S. Wales in Oct. 1913, springing up near Merthyr-Tydfil and dissipating in Cheshire. A. T. in Oklahoma on 9 April 1947 killed 167 people and caused damage to property of nearly \$10m. From 1916 to 1947 the average yearly number of Amer. T.s was 141, the average loss of life 235, and the average loss to property \$12,300,000. The water-spout (q.v.) at sea is a similar phenomenon. In W. Africa the name is applied to the squall that accompanies a thunder-storm (q.v.). See CYCLONE; HURRICANE; TYPHOON.

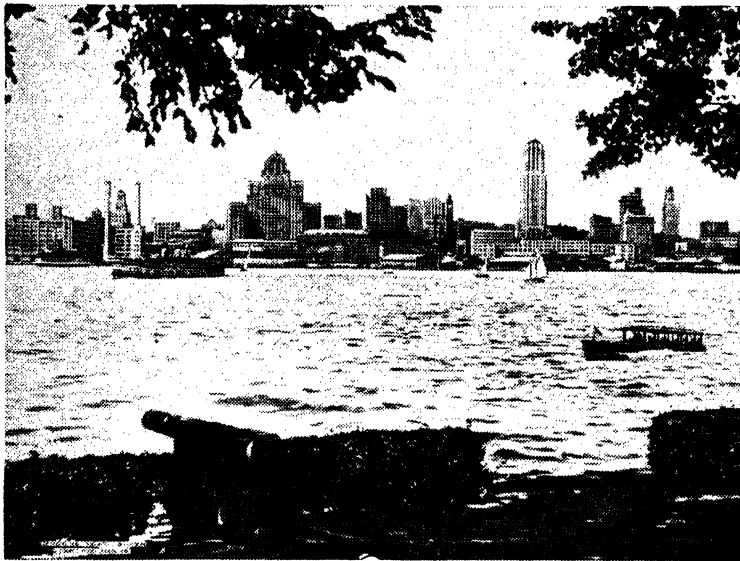
Toro (anti Arbocala), Sp. tn in the prov. of Zamora, on the Duero. It has many ancient buildings of interest, and is famous for its wines. Pop. 8300.

Toronto, cap. of the prov. of Ontario, Canada, in York Co., 1800 m. W. of the Atlantic Ocean on a bay on the N. shore of Lake Ontario, 330 m. NW. of New York City, 333 m. SW. of Montreal, and 238 m. E. of Detroit. The cross-roads of trade since Indian times, T's strategic

position was fought for by French, Americans, and English. Its well-sheltered harbour, the finest on the Great Lakes, handled 4,310,900 short tons of water-borne trade in 1948. Co-ordinated water, rail, highway, and air transit services include 2 of the world's greatest railway systems, Canadian National and Canadian Pacific, buses, steamships, and Trans Canada and Amer. Airways air service to all parts of the world. A great commercial centre, it has the largest live-stock market in Canada, over 4000 manufacturing establs. with gross value of products of more than \$1,686,000,000,

Maple Leaf Gardens, in winter the T. home of Canada's national sport, hockey. The Canadian National Exhibition, largest ann. exposition in world, occupies in Aug. and Sept. a 350-ac., municipally owned park on the shore of Lake Ontario, where the Royal Agric. Winter Fair, one of the 3 major live-stock shows on the continent, is also held annually. A new rapid transit system to provide increased, speedy transportation in the form of modern subways, began in 1949 with the building of Yonge Street subway, which was opened in 1954.

The univ. of T., founded in 1827, had



TORONTO: A VIEW FROM CENTER ISLAND

including meat-packing, electrical equipment, agric. implements, bakery products, clothing, furniture, automobile supplies, pianos, foundries, brewing, and distilling works. T. is the leading Canadian city in wages and salary payroll, bank clearings, postal revenue, telephone installations, and car loadings. Imports cleared through the Customs Ports of Toronto in 1953 amounted to \$650m.; exports, \$27m. (*Trade of Canada*, Dominion Bureau of Statistics). In volume of trading T. Stock Exchange is the second largest in the world.

T. is served by municipally owned water works, hydro-electric power supplied by Niagara Falls, gas works, electric street railways, trolley buses, and motor coaches, and has an airport. One of the world's great sports cities, it has 4 race tracks, a large baseball stadium, and one of the world's largest indoor sports arenas,

a registration of 11,400 in the year 1955-6 in Faculties of Arts, Science, Medicine, Music, etc., the chief colleges being Univ. Victoria (United Church), Trinity (Anglican), St Michael's (Rom. Catholic), with federated theological colleges, Knox (Presbyterian), Wycliffe (Anglican), Emmanuel (United Church), and St Michael's, with which is affiliated St Michael's Pontifical Institute of Medieval Studies, the only Institute in N. America empowered to grant Pontifical Degrees. T.'s School of Medicine has developed the Connaught Laboratories, and the Banting and Best Institute, named after the late Sir Frederick Banting and Dr Charles H. Best, who discovered insulin in one of the most accurately planned scientific developments ever known, at the physiology laboratories at the univ. of T. in 1921. T. hospitals include T. General, Sick Chil-

dren's, and Sunnybrook, largest and most modern Canadian military hospital. T. is also the centre of Dominion Meteorological services. The Royal Ontario Museum, largest in the Brit. Commonwealth outside London, is famous for its Chinese collection. The Conservatory of Music, incorporated in 1886, passed under the trusteeship of the univ. in 1921 and was granted the title of Royal T. Conservatory of Music in 1946 on the occasion of its diamond jubilee. It is the

tion, High, Riverdale, Queen's, Sunnybrook, Sunnyside, and T.'s island parks.

The site of the present city of T. was chosen by Lord Dorchester, governor of Canada, as the seat of gov. for the newly created prov. of Upper Canada in May, 1793. Sir John Graves Simcoe, first lieutenant-governor, named the new tn York. It was occupied by U.S. forces in 1813, when legislative buildings and archives were burned and the mace carried away, to be returned by President



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UNIVERSITY AVENUE, TORONTO, ONTARIO

dominant force in musical education in Canada. T. had its first full-size symphony orchestra in 1894, and now supports 2 symphony organisations, the T. Symphony Orchestra and the T. Philharmonic Orchestra. T. Art Gallery contains the second largest collection of Canadian paintings in the world. Other interesting buildings include the Prov. Legislative buildings, City Hall, Casa Loma, Bank of Commerce Building (tallest in the Commonwealth), T. Public Library, with 17 branches and total circulation of 4,724,332 vols. (1957); St James (Anglican) and St Michael's (Rom. Catholic) cathedrals, Metropolitan (United) Church with its famous 52-bell carillon, the first tuned to the chromatic scale. 105 parks and playgrounds cover 2035 ac. of land and 159 ac. of water, including Exhibi-

Roosevelt at the centennial celebrations in 1934. Self-gov. was granted to the tn of York in 1817, and it was incorporated as a city under the name of T. in 1834, with William Lyon Mackenzie as its first mayor. Its name, of Huron Indian origin, means 'a place of meeting.' Pop. 675,754; Greater T. 1,230,000. See J. C. Dent, *Toronto: Past and Present*, 1884; *University of Toronto History*, 1925; *Toronto Municipal Handbook*, 1957.

'Toronto Daily Star,' Canadian daily newspaper, estab. 1892, circulates throughout the prov. of Ontario and has full coverage of world and home news. Associated with it is the *Star Weekly*, the largest single periodical in Canada, estab. 1910, also pub. in Toronto with a national circulation.

'Toronto Globe and Mail,' Canadian morning newspaper, estab. 1844. It gives extensive coverage to foreign and national affairs and enjoys wide circulation throughout Canada. It is independent in politics.

Torpedo. In the days before the advent of the locomotive T., all submarine explosive devices, whether stationary or mobile, were referred to as T.s. These early T.s were of many different forms; one type was towed across the bows of enemy vessels by small torpedo-boats (q.v.); another was the 'spar' T., which was carried on the end of a spar at the bows of a launch. The spar was arranged to lower the T. below the water-line just before striking, later models being fired electrically. As the result of equipping battleships with additional small guns and the installation of searchlights, the use of the above kinds of T. became a practical impossibility, and efforts were concentrated upon the development of a type which could drive itself. *Whitehead's T.* was constructed to ideas of Capt. Luppis of the Austrian Navy, but was first practically evolved in 1866 by Whitehead, whose practical mechanical skill completely altered the original ideas. The first type was too uncertain in vertical direction but the introduction of the 'balance chamber' in 1868 obviated the troubles of skimming and diving. The secret was purchased by the Brit. Gov. after successful trials, and in 1876 the servo-motor was added by Whitehead. Improvement continued, and to-day every navy uses the Whitehead T. in a highly developed form, though there are many patterns.

The shape of the modern T. resembles a cigar with a rounded or blunt nose, upwards of 20 ft long by as many in. in diameter and constructed of special steel. It is divided into a number of compartments: the explosive head, compressed-air chamber, balance chamber, engine room, and buoyancy chamber. In war-time about 600 lb. of high explosive are stored in the head and are fired on contact with the target by means of an arrangement called a pistol, located in the extreme nose. The blow need not be directly head-on to detonate the charge, there being other side-projections capable of causing the explosion in the event of an oblique strike. To render the T. safe whilst being handled and until it is clear of the ship, there are 3 safety devices fitted, viz. a safety-pin, which is first withdrawn; small vanes, so set that the rush of the T. through the water causes them to rotate and unscrew until they fall off; and lastly, the force of impact against the target must be sufficient to shear through another pin before finally the point of the striker fires the charge. For peace-time practice, special heads are fitted containing water and cork. The head is bolted on to the compressed-air chamber, which is forged from high-tensile steel and contains air at a pressure of over 1 ton per sq. in. supplied from air compressors on board the warship. Next follows the balance chamber containing the mechan-

ism for controlling the depth the T. will run at, as well as, in the later types, vessels containing fuel, water, and a special heater apparatus. Depth control is effected by a swinging weight or pendulum which, being affected by any alteration in tilt, sets in motion a servo-motor, contained in the engine-room, which provides the necessary power to actuate the horizontal rudders which correct the vertical deflection of the T. from its proper depth. A hydrostatic valve is fitted to ensure that the T. attains the correct depth. The engines, placed abaft the balance chamber, are of the 4-cylinder, single-acting, Brotherhood type, and are marvels of ingenuity. Normally they are driven by compressed air, though in the latest types fuel and air are burnt in a special generator and form steam, which is led to the engines. The exhaust is allowed to escape and rises to the surface in the form of bubbles, making a track which can be clearly seen from the bridge of the ship attacked. Next comes the buoyancy chamber, whose primary purpose is to give the necessary buoyancy to the T. Herein is situated the gyroscope, which rotates at high speed, is delicately suspended in gimbals, and is connected to the vertical rudders. The gyroscope tends always to maintain the direction of its spinning axis, and this is used in conjunction with a servo-motor to actuate the vertical rudders and correct any deflection as soon as it occurs. At the tail are situated the vertical and horizontal rudders which keep the T. on its course and prevent it from sinking or jumping out of the water. Behind the rudders are situated 2 4-bladed propellers, driven by the engines, which rotate in opposite directions, thus preventing the T. from any heeling due to the torque reaction which would occur if only one screw were fitted. Exact details of the latest types are secret, but figures which have been pub. show that ranges exceeding 15,000 yds and speeds of over 45 knots have been obtained. Efforts are being made to control them by radio. Acoustic T.s were developed by the Germans during the Second World War. These T.s are attracted by sound waves emanating from their target.

T. tubes from which T.s are ejected are either submerged, as in submarines, or above water, as fitted in light cruisers and destroyers, and the firing impulse is given by compressed air or explosive. Another method of discharging them is by means of special dropping-gear from aircraft. The submerged tube has the advantages that the T. cannot be damaged by shell-fire when within the tube prior to discharge and that the moment of release cannot be detected by the enemy. In this type of tube the orifice can be closed by a watertight door, when a rear door may be opened to allow the T. to be placed in position. To fire, the rear door is closed, the outer door opened, and a blast of compressed air blows the T. out of the tube.

Human T.s or 'chariots' were successfully used in the Second World War, first by the Italians and later by the British. Human T.s are about the same size as the

ordinary T., and are driven by electric batteries. They are manned by a crew of 2, who wear diving-suits and sit astride the weapon. A charge similar to the warhead of the ordinary T. is attached to the nose. The Human T. is manoeuvred at slow speed towards its target and dives under it. The charge is then detached and fixed to the bottom of the enemy ship; the fuse is set and the human T. is driven away to be clear of the target area before the charge detonates.

Torpedo, or **Electric Ray**, a member of the elasmobranch family Torpedinidae. T.s are characterised by the possession of electric organs which are present between the head and the pectoral fins. The shock which they are capable of producing is from 20 to 30 volts in *T. marmorata*.

Torpedo Boat and **Torpedo Gunboat**. Both these types of craft are obsolete in modern navies, having been replaced by the destroyer (q.v.), and motor T. B., now classified, together with motor gunboats, as fast patrol boats. The earliest type of T. B. was merely a launch fitted with spar torpedoes; later the method adopted was to tow the torpedo across the bows of the enemy vessel. The first T. B. was built by Messrs. Thornycroft for the Norwegian Gov. in 1873, for the 'towing' type of torpedo. In 1879 the Brit. Admiralty had built the T. B. *Lightning*, of 27 tons, 19 knots speed, and fitted with a bow torpedo tube for launching a locomotive torpedo of the Whitehead type. As time went on this class of vessel grew in size, speed, and armament and became a grave source of danger to battleships, necessitating other means of countering them than quickfiring guns and torpedo nets, particularly as torpedoes were fitted with net cutters. A special class of vessels, termed 'torpedo gunboats' or 'torpedo catchers,' was introduced to destroy the T. B.s. They were armed with 4-in. and 3-pounder quick-firing guns and, later, torpedo tubes, but were never successful, owing primarily to their lack of speed, and were entirely superseded by the T. B. destroyer, which was able to combine effectively the functions of T. B. and catcher.

Torpedo Boat Destroyer, see DESTROYER, TORPEDO BOAT.

Torpedo Ejector, or **Torpedo Tube**, see TORPEDO.

Torquatus, name of a patrician family of the gens Manlia. *Titus Manlius Imperiosus* fought against the Gauls (361 BC), winning his name T. by taking the necklace (*torques*) from the body of a mighty Gaul slain by him in single combat. He was dictator 353 and 349, and consul 347, 344, and 340. With P. Decius Mus he defeated the Latins at the foot of Vesuvius. (See Livy, iv. 5, viii. 3-12; Cicero, *De Officiis*, iii. 31.) *Titus Manlius*, conqueror of the Sardinians, was consul 235 and 224, and censor 231 BC. With hereditary sternness he opposed the ransom of the Rom. prisoners of Cannae in the Senate (216). He was dictator in 210. *Lucius Manlius* was consul with L. Aurelius Cotta (65 BC). He helped to suppress Catiline's conspiracy (63), and

supported Cicero in his exile (58). *Lucius Manlius*, his son, was praetor 49 BC, and opposed Caesar on the outbreak of civil war. Obligated to surrender Oricum, he was taken prisoner (48), but released. He fought again in Africa, but was captured and slain (46), on the defeat of the Pompeians. A. Manlius, friend of Cicero, presided at the trial of Milo for bribery as praetor (52 BC). He sided with Pompey in the Civil war, and was an exile at Athens (45).

Torquay, municipal bor., seaport, and holiday resort of S. Devon, England, on Tor Bay, 26 m. S. of Exeter and 199½ m. by rail from Paddington (London). Its picturesque scenery and mild climate make it a favourite health resort. Terra cotta, clay, and marble are found in the neighbourhood of the tn. The Domesday survey identifies part of the site of T. with the Norman period, recording that William I gave the manor of *Cockington* (now Cockington) to a follower, Hostliarius. But by far the earliest link with the past is Kent's Cavern, in the Ilsham valley. A large and fine collection of the remains of extinct animals which once frequented the cave, and of the implements made by the men of the Old Stone Age, forms part of the exhibits at the Museum of the T. Natural Hist. Society. In 1196 the Premonstratensian canons regular founded Torre Abbey, the ruins of which, together with the restored Monastic Barn and the Mansion House dating in some parts from about the 15th cent., are a conspicuous feature to-day on the seashore. The development of T. as a modern seaside resort dates back to the end of the 18th cent., when 'Tor Kay' or 'Tor Key' was no more than a cluster of fishermen's huts on the shore with the vil. of Tor (or Torre) about a m. inland. To deal with the threat of invasion by Napoleon, ships of the Fleet constantly used Torbay as an anchorage, and houses were built on the shores of the bay for the accommodation of the wives and families of the officers. Of T.'s total acreage (6244) over 1000 ac. are occupied by parks, pleasure grounds and public gardens, with tennis courts, bowling greens, etc. Torbay, which is notable for its regattas, provides one of the best yachting courses in Great Britain and has been the scene of America's Cup trials; the yachting events of the 1948 Olympic Games were contested in the bay. In the tn hall there is a tablet in honour of Prof. Oliver Heaviside (q.v.), who lived here for a period of his life. Babbacombe (q.v.), 2 m. N. of central T., on Babbacombe Bay, is now part of the bor. of T. Cockington, an old-world thatched vil. ½ m. from T. railway station, has for long been part of the bor. Its little church in its present form is of the Norman period. In the neighbourhood of T. are traces of both Rom. and Saxon occupation. Pop. (estimated) 50,000.

Torque Amplifier and **Torque Converter**. It is often necessary for an operator to be able to rotate massive pieces of mechanism such as a rudder of a liner or the guns

of a ship. The operator can only exert a feeble twist or torque on the controlling device fixed in his observation post, so that some intermediate mechanism is required to magnify or amplify this torque in order to perform the required operations. This intermediate mechanism is called a *torque amplifier*, and the principle of its action is as follows. The operator applies a feeble torque to a control-shaft that causes friction bands to engage with 2 drums rotating in opposite directions. The bands also engage with a shaft connected to the mechanism to be rotated, and the magnitude of the torque applied to this shaft depends on the friction between the bands and the rotating drums. Hence the feeble torque provided by the operator controls the extent to which the bands are brought into contact with the drum, while the final torque applied to the mechanism depends on the speed of rotation of the drums.

The *torque converter* acts as an infinitely variable gear, usually with varying efficiency.

Torquemada, Tomás de (1420-98), Dominican friar, b. Valladolid, who in 1483 was entrusted by Queen Isabella with the estab. of the Sp. Inquisition. Ascetic in his private life, he was severe to the point of cruelty towards suspected or convicted heretics. Of 100,000 said to have been accused, 1000 were put to death, others fined and penanced. He was one of the leading instigators of the conquest of Granada and of the expulsion of the Jews. See W. F. Walsh, *Isabella of Spain*, 1937; E. Lucka, *Torquemada und die spanische Inquisition*, 1926; life by H. G. de Saint Amand, 1910.

Torre, Duque de la, see SERRANO Y DOMÍNGUEZ.

Torre, Víctor Raúl Haya de la (1895-), Lat.-Amer. political leader, member of a prominent family in Peru; educ. in Lima and at Oxford. His party, 'A.P.R.A.', advocates that the Amer. Indians, who are very numerous in some of the reps., should have an equal voice in the political and educational affairs of their countries. T. is the author of *Adónde va Indoamérica?*, 1935. See also International Court of Justice, *Haya de la Torre Case*, Judgment of June 15th 1951.

Torre Annunziata, It. seaport, in Campania (q.v.), on the bay of Naples (q.v.), 10 m. SE. of Naples. It manufactures macaroni, and has ironworks and fisheries. Pop. 50,600.

Torre del Greco, It. resort and fishing tn, in Campania (q.v.), on the Bay of Naples (q.v.), 6 m. SE. of Naples. It stands near the SW. foot of Vesuvius (q.v.), which has frequently damaged the tn by eruptions. It has boatbuilding yards, and produces canoes, and worked coral and lava. Pop. (com.) 62,300.

Torrence, Frederic Ridgely (1875-1950), Amer. poet and playwright, b. Xenia, Ohio. He was educ. at Miami Univ., for 6 years was a librarian in New York, then held various editorial posts, from 1920 to 1933 being literary editor of the *New Republic*. After making a tour of Europe with his friend Wm Vaughn Moody he

began writing verse plays and composed *El Dorado*, 1903, and *Abelard and Heloise*, 1907. These were followed by his plays for a Negro theatre, *Granny Maumec*, *The Rider of Dreams*, and *Simon the Cyrenian*, all produced in 1917. A pioneer in this type of production, he opened the way for others such as O'Neill's *Emperor Jones* and Connelly's *The Green Pastures*. Of his vols. of verse *Hesperides* appeared in 1925, *Poems*, which received the Shelley Memorial Prize, in 1941, and *Last Poems* in 1944.

Torrens, Lake, large salt lake of S. Australia, discovered in 1840 by Eyre, 35 m. N. of Port Augusta. It is 40 m. N. of Spencer Gulf, in the N. part of the Great Valley and 80 ft above sea-level. Its average breadth is 20 m., length 130 m. It becomes a marsh in dry weather.

Torreón, tn of Mexico, in the state of Coahuila, and standing 3800 ft above sea-level, 500 m. NW. of Mexico City. It is an important railway junction, lines radiating to Chihuahua, Durango, Zacatecas, Fresnillo, and Monterrey. Its industries include cotton mills, smelting works, and flour mills, and there are coal and other mines in the dist., which is also an important wheat production area. Pop. 75,800.

Torres, Niceto Alcalá Zamora y, see ZAMORA Y TORRES.

Torres Strait, in the S. Pacific Ocean, between New Guinea and Australia, from 80 to 90 m. broad. It contains sev. is., the chief of which are Banks and Prince of Wales Is. Reefs and shoals abound, rendering navigation difficult.

Torres Vedras, tn of Portugal, in Lisboa dist., 27 m. N. of Lisbon (q.v.). It was here that Wellington (q.v.) constructed the famous field-works called the 'Lines of Torres Vedras' during the Peninsular War (q.v.), when he withdrew his forces, in face of Masséna's invasion of Portugal, for the winter of 1810. The triple line of fortifications, stretching to the Tagus (q.v.), consisted of 100 forts joined together by entrenchments and inundations, and Wellington successfully defended it until he was able to advance and drive the French back into Spain. T. V. is the centre of a wine-producing region, and has manufs. of ceramics and gunpowder. Pop. 5000.

Torricelli, Evangelista (1608-47), It. physicist, b. Faenza. He acted as Galileo's secretary, and, prompted to many of his discoveries by the study of that scientist's works, he succeeded Galileo as prof. of mathematics at Florence. Besides making a barometer—an invention commemorated in the names of Torricellian tube and Torricellian vacuum—he solved the problem of the quadrature of the cycloid. *Opera Geometrica*, 1644, is his prin. work.

Torridge, riv. of Devon, England, rising 4 m. SE. of Hartland Point, and joining the Tav estuary at Barnstaple Bay.

Torridon, hamlet at the head of Loch T. (salt-water), on the W. coast of Scotland, in Ross and Cromarty, set amid magnificent mt scenery Liathach, 3455 ft).

Torridonian, name applied to a series of Pre-Cambrian sediments, chiefly sandstones and arkoses, which are exposed along the seaboard of NW. Scotland and which have been named after the village of Torridon (q.v.).

The T. rests unconformably upon the Lewisian (q.v.), and in turn is unconformably covered by Cambrian sediments. No fossils have as yet been found in the T., which has been divided into 3 stratigraphical divs.; the Diabaig Group; the Applecross Group, and the Aultbea Group at the top. Shales occur at the base of the Diabaig group, but in general the series is arenaceous and shows clear signs, such as slump beds, of subaqueous deposition. However, the T. lies upon an old landscape of marked relief carved out of the Lewisian gneiss, and the exact conditions under which the T. were deposited are not yet known.

Torrigiano (or Torrigiani), Pietro (1470-1522), Florentine sculptor, said to have broken Michelangelo's nose in a quarrel. T. worked in Rome for Pope Alexander VI.; was a hired soldier for a while in various states; was then invited to England to execute the tomb for Henry VII and his queen in Westminster Abbey, which he completed in 1519—a splendid work in the mature Renaissance style. A tomb for Henry VIII at Windsor was left unfinished and its bronze melted during the Commonwealth. T. d. in Spain, where he was imprisoned by the Inquisition.

Torrington, Viscount, see BYNG, GEORGE.

Torrington: 1. Industrial city on Naugatuck R. in Litchfield co., Connecticut, U.S.A. Textiles, engines, hardware, tools, machinery, needles, electrical equipment, lumber, and brushes are produced. The site of John Brown's bp. is marked, and a state forest is nearby. T. suffered heavy damage in a flood in 1955, but is rebuilding rapidly. Pop. 27,820.

2. or **Great T.**, a mkt tn and mun. bor., on the Torridge, in Devon, England. Its Saxon name was Toritone. The bluecoat school was estab. in 1671. There is a milk-canning factory, and gloves are made. Pop. 2875.

Torsion, strain produced by a twisting motion, for example, by a couple acting in a plane at right angles to the axis of a prism, cylinder, or other body. The distortion produced is a type of shearing stress. Resistance to T. determines the rigidity of the bar, and resistance to permanent distortion depends upon its elasticity. The amount of 'torque' or twist required to produce T. in cylindrical bars of the same material varies as the fourth power of their diameters. In bars of section other than circular the rigidity is lessened, so that in practical application cylindrical bars are best adapted to resist a twisting strain. See ELASTICITY; MODULUS; STRAIN AND STRESS.

Torsion Balance, Coulomb's, see ELECTROSTATICS.

Torstenon, Lennart (1603-1651), Swedish soldier, b. Torstena. After serving under Gustavus Adolphus, he became a

leader in the Thirty Years War, becoming commander-in-chief in 1641. His greatest victory was at Breitenfeld in 1642, over the Imperialists. In 1643 he defeated the Danes, the Imperialists again in 1644, and threatened Vienna in 1645.

Tort (Lat. *torlus*, twisted), is the breach, by act or omission, of a duty imposed by law and not by contract, which gives the injured party a right to damages, e.g. trespass (q.v.), slander, libel, detinue (q.v.), negligence and nuisance (q.v.), and assault. A T. has some of the characteristics of a criminal offence, but is to be distinguished therefrom, though many crimes necessarily include a T. (e.g. a public nuisance causing special damage to an individual; rape), but every T. does not amount to a crime (e.g. slander and seduction are merely T.s), nor does every crime amount to a T. (e.g. blasphemy and treason). Where the T. is punishable summarily and the magistrates dismiss the case, no further proceedings, criminal or civil, can be taken. A cause of action in contract may co-exist with a T., i.e. the same facts may give A a remedy in contract against B and also a remedy in T. against C, e.g. where A is injured in alighting on a defective wharf belonging to B shipping company, from a ship belonging to C shipping company, which enjoys unloading rights of B's wharf (see Sir F. Pollock, *Law of Torts*, 1887); conversely there may be 2 causes of action, one in T. and one in contract with a common defendant; and generally, when a contract inevitably gives rise to duties independently of the contract itself, the breach of them often amounts to a T., e.g. where A purchases goods on credit from B, and B resells before A makes default in payment, A can sue B for conversion. See Sir F. Pollock, *Law of Torts* (15th ed.), 1951; Sir J. W. Salmond, *Law of Torts* (11th ed.), 1933; G. F. Clerk and W. H. Lindell, *Law of Torts* (11th ed.), 1954; P. H. Winfield, *A Textbook on the Law of Tort* (6th ed.), 1954.

Torticollis, contracture of the sternomastoid muscle in the neck, usually on one side, causing an abnormal posture of the head, or 'wryneck.' T. may be present in infants from birth injury, and usually needs surgical intervention for its cure. In adults it may be caused by some irritant to the muscle or the nerve supplying it or, quite simply, by some passing inflammation due to a draught playing on the muscle—i.e. a stiff neck.

Tortoise, name for all the land Chelonians, and often applied to all members of the family Chelonina with the exception of the marine Chelonians or turtles. All members of the order are cold-blooded, 4-footed reptiles, without teeth, and are protected by a shell, or leathery case. All lay eggs, but otherwise there is wide diversity in their habits. They are of great geological age, and their tenacity of life has enabled them to survive where more recent animals of higher types have become extinct. The most familiar example of the land T.s (*Testudines*) is the common or Gk T. (*Testudo graeca*), which occurs around the Mediterranean and is

much kept as a pet. It is entirely vegetarian in its diet, though frequently sold as an insect killer. Another T. which is sometimes offered for sale is the riv. T. (*Emys orbicularis*); this is a type of the riv. and marsh T.s (*Emydes*), and is distinguished by its small yellow spots; this eats insects, worms, etc. Among the mud or soft T.s (*Trionychoides*) are various Amer. and Indian species which are frequently killed for food, the flesh being well flavoured. The most important of the turtles (*Cheloniidae*) are the edible green turtle (*Chelonia mydas*) and the hawksbill turtle (*C. imbricata*), from which tortoiseshell is derived. Among the most interesting kinds of T. are the Giant T.s formerly found in great numbers in the Galapagos and Mascarene Is. When discovered these is. were uninhabited; the T.s therefore enjoyed perfect security, and this, as well as their ordinary longevity, accounts for their great sizes (as much as 5 ft in length) and numbers.

Tortoise Plant, see ELEPHANT'S FOOT.

Tortoise-shell, in commerce, is the horny plates of the hawksbill turtle (*Chelonia imbricata*). The largest of these plates are about 18 in. long by 6 in. broad, and rarely exceed $\frac{1}{4}$ in. in thickness. T. is semi-transparent, and mottled with various shades of yellow and brownish-red. Its value depends on the brightness and form of the markings, and, if taken from the animal after death and decomposition, the colour of the shell becomes clouded and milky. Hence great cruelty has been exercised in removing the plates from living turtles, but the finest T. is derived from shells immersed in boiling water immediately after the death of the animal. Numerous imitations and substitutes are made. T. is used for making combs, snuff-boxes, and a number of fancy articles, as a material for inlaying ornamental furniture, as a veneer, and as a ground substance in which the precious metals and mother-of-pearl are inlaid.

Tortola, see VIRGIN ISLANDS.

Tortosa (anc. *Dertosa*), Sp. tn in the prov. of Tarragona, on the Ebro (q.v.). It is a granite tn, with a Gothic and Baroque cathedral, old walls, and some fine anc. houses. It manufs porcelain, leather, and glass, and has a trade in oil, wine, and rice. Pop. 48,200.

Torture. The application of bodily pain (i) as a prelude to or accompaniment of capital execution, (ii) as an act of vengeance upon defeated enemies, and (iii) as a means of extracting confessions or other evidence from accused persons, is of great antiquity alike among barbarians and otherwise highly cultured peoples. It has taken a large variety of more or less atrocious forms; and methods employed in medieval England included the boot and the *peine forte et dure* (piling weights on the prostrate body of the victim). T. was often part of the penalty for treason. Pope Innocent IV (q.v.) authorised T. for use by the Inquisition (q.v.), which generally had recourse to flogging, the rack, the strappado, or the ordeal by burning coals.

In England T. virtually ended in 1640.

It was abolished in France at the Revolution (1789); in Scotland by an Act passed in 1709. It was unknown in the Ger. municipalities until the end of the 14th cent., but once introduced it remained lawful (though only intermittently resorted to after 1750) in Hanover, Bavaria, and some of the smaller Ger. states until the first decade of the 19th cent., while in Austria, Prussia, and Saxony it virtually ceased in 1750, and in Russia was finally abolished in 1801. T. was used by the Nazi regime in Germany (1933-45) to extort information from political prisoners and as a form of punishment in concentration camps, and by the Japanese also during the Second World War. The govts. of the Soviet Union and the Communist countries in E. Europe have used T. as a means of extracting confessions from political prisoners prior to their trial by Peoples Courts. Cardinal Mindszenty, the Primate of Hungary, confessed at his trial to treasonable activities; in Nov. 1956, following the Hungarian people's revolt against Russian domination, he explained that he had been beaten and subjected to continuous questioning for days on end without sleep. The mental and moral resistance of political prisoners in Communist countries has been broken by such cruel treatment as being forced to stand for hrs in the same position under the glare of blinding light, having lighted matches placed under their finger-nails, being exposed to extremes of heat and cold, and deprivation of food.

Toru Dutt, see DUTT, TORU.

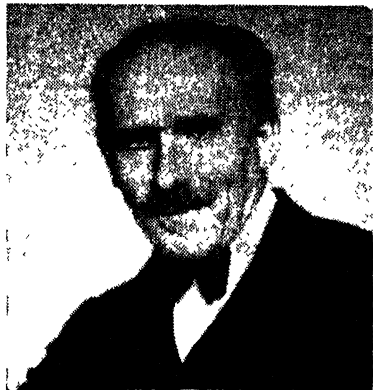
Torula, old generic name for a group of yeast-like organisms now classified under the genus *Torulopsis*.

Torún (Ger. *Thorn*), tn of Poland, in Bydgoszcz prov., on the Vistula (q.v.), 26 m. ESE. of Bydgoszcz. It was part of Germany (Pomerania, q.v.) 1793-1807, 1815-1918, and 1939-45. Treaties concluded here in 1411 and 1466 made the Teutonic Knights (q.v.) vassals of the Polish kings. Copernicus (q.v.) was a native. There are engineering, chemical, and textile industries. Pop. 80,000.

Tory, synonym, though historically inappropriate, for a Conservative. The word T. is Irish, and signified, during the time of the wars in Ireland in the reign of Elizabeth I, a kind of robber who, being attached to neither army, preyed generally upon the country without distinction of English or Spaniard. They were especially prominent in the Protestant massacres of 1641. From this the term came to be applied to a body of men who, in 1680, appear to have ridiculed the Popish Plot and yet encouraged the Papists to revive it. Their political object was to banish the Duke of Monmouth and recall the Duke of York, and to further their end they endeavoured to thwart the Bill of Exclusion (from their abhorrence to which they were called 'abhorrrers' and their opponents the 'petitioners'). Ultimately the 'abhorrrers' and 'petitioners' became identified with the terms Tories and Whigs respectively.

Toscana, see TUSCANY.

Toscanini, Arturo (1867-1957), It. conductor, b. Parma. He studied at the Parma Conservatory, where he gained his diploma in cello and composition in 1885, and began his career as a conductor in 1886 at Rio de Janeiro. His reputation rapidly gained ground. After sev. years at Turin he was appointed to La Scala, Milan, in 1898 and in 1907 he was nominated conductor to the Metropolitan, New York. He was conductor of the Philharmonic Symphony Society of New York. His chief centres of activity were the opera-houses and concert halls of Milan and New York, but he was also guest conductor at Bayreuth, Vienna, Salzburg, Paris, and elsewhere.



Press Portrait Bureau

ARTURO TOSCANINI

He conducted at Covent Garden during the Coronation celebrations of George VI, 1937. The concerts conducted by him in the Augusteo in Rome became memorable. Many new It. operas were presented by T. See lives by G. M. Ciampelli, 1923; T. Nicotra, 1929; P. Stefan, 1936; A. Della Corte, 1946; F. Sacchi, 1951.

Tost, see ALBANIA, Language.

Tostal, the Irish tourist festival, was launched at Easter 1953 with the primary aim of extending the Irish tourist season. The Gaelic word *Tostal* means a festive gathering, and *An Bord Fáilte*, the Irish State-directed Tourist Board, who are in charge of the festival, have endeavoured to make it live up to its title. It has been held for 3 weeks each year since 1953, and has featured, in cities, towns, and resorts all over the Rep., pageantry, exhibitions of every kind, drama festivals, athletic events, and such distinctive Irish features as currach racing, mumming, and open-air displays of step-dancing and traditional music and songs. In 1955 the festival was advanced so as to be held during May, as this is generally the sunniest and driest month of the year in Ireland.

Tosti, Sir Paolo (1846-1916), It. composer, b. in the Abruzzi. He came to London when about 30 years old, and held the position of singing teacher at the Royal Academy of Music. He was knighted in 1908. He was the singing-master to the Queen of Italy and later to the Brit. Royal Family, and settled permanently in London. He composed hundreds of light drawing-room songs, *Goodbye* being probably the favourite in a mass of very popular work.

Tostig (d. 1066), Earl of Northumbria, son of Earl Godwin (q.v.). In 1065 he was banished from his realm because of his cruel, repressive measures and replaced by Morcar. The following year he returned with Hardrada, King of Norway, and was slain at Stamford Bridge by his brother, King Harold.

Totalisator, machine, or apparatus, set up on race-courses for recording bets and payment of winnings on the principle that all money staked is pooled and shared (subject to a percentage deduction) by those who have backed winners. This system, known as the *pari-mutuel*, was invented in France by M. Oller in 1872. The first machine used to operate this system was set up at Christchurch, N.Z., in 1880, and the first T. in Europe was operated at Longchamps, near Paris, in 1929. T.s were introduced into Britain in the same year, and by the end of 1930 92 race-courses were provided with T. facilities. They were also in the same year installed at many greyhound tracks. A mechanized *pari-mutuel* system was operated in Maryland, U.S.A., in 1930.

In Great Britain T.s are operated on horse-racing courses by the Racecourse Betting Control Board, constituted under the Racecourse Betting Act, 1928, with a view to benefiting, by the legislation and estab. of T.s on race-courses in Great Britain, the horse-breeding industry, the sport of horse-racing, and charities. Under the Betting and Lotteries Act, 1934, veterinary science also benefits. The Board's normal statutory deduction is 15 per cent from losing stakes, the only exceptions being double and treble event pools and pools at point-to-point meetings (deduction, 10 per cent from pools).

On a fully mechanised installation, at the time of the issue of the tickets, each 2s. unit is automatically added and recorded on a miniature indicator in the control room and simultaneously indicated to the public on the main indicators. The prices of tickets on a race-course are 4s., 10s., 21, 25, and on a few occasions, 210 and 250. Facilities also exist for 'off-the-course' betting. T. betting represents only a small proportion of off-course betting on horse-racing, whereas it represents a larger proportion of on-course betting. The amount staked with the T. on horse-racing 1929-57 inclusive was £369,574,383, the average ann. turnover 1948-57 being £25,500,000, the peak year being 1957 with £27,052,028. Two representatives each of the secretary of state for the Home Dept and the National Hunt Committee, 3 from the Jockey Club and 1

representative each of the secretary of state for Scotland, the chancellor of the Exchequer, Tattersalls' Committee, the minister of agriculture and fisheries, and the Race-course Association, Ltd. form the Race-course Betting Control Board. In greyhound racing all the 65 tracks under the control of the National Greyhound Racing Club are equipped with totalisators which were legalised on greyhound race-tracks by the Betting and Lotteries Act of 1934. The deduction authorised by this Act was 6 per cent, but in 1948 a betting tax of 10 per cent was imposed by the Government, bringing the total deductions from the pools to 16 per cent. In 1957 the turnover on the tote was approximately £60 million compared to the peak year of 1946 when the total was £199 million. For discussion of T. and *pari-mutuel* systems, see BETTING.

Totalitarian Government, see GOVERNMENT; INDIVIDUALISM.

Totemism (Algonquin Indian *totem*, my 'otem' or guardian spirit, pronounced *to-daim*), belief prevailing among primitive peoples of kinship with or descent from an animal or plant. T. accounts for such mythological phenomena as the animal-headed gods of Egypt, anthropomorphic totems in a state of high evolution. T. certainly existed among many European and Asiatic peoples, and still does among, notably, the N. Amer. Indians and Australian aborigines. In sev. Indian 'nations' each individual of a tribe possesses a personal totem which he receives in a dream induced by drugs or hunger at the age of puberty. In Australia and Africa there are clan totems, and it is thought particularly wrong to hunt, kill, or eat one's totemic animal. See F. B. Tylor, *Primitive Culture*, 1871; A. Lang, *Secret of the Totem*, 1905; Sir J. G. Frazer, *Totemism and Exogamy*, 1910; S. Freud, *Totem and Tabu*, 1913; E. Durkheim, *The Elementary Forms of the Religious Life* (Eng. ed.), 1915; W. Schmidt, *Origin and Growth of Religion*, 1930; A. R. Radcliffe-Brown, 'The Sociological Theory of Totemism' in *Structure and Function in Primitive Society*, 1952.

Totila (d. 552), king of the Ostrogoths in Italy, was proclaimed in 541. He at once began the restoration of the Ostrogoth kingdom of Italy and gained a victory over the Romans near Faenza. He captured Rome in 546. In 547 Belisarius (q.v.) recovered possession and repulsed 3 assaults of T., who did not succeed in retaking the city till 549. Owing to T.'s continued successes the Emperor Justinian sent a large army against him led by the eunuch Narses (q.v.), who encountered T. at Tagina and killed him.

Totnes (the *Totenens* of Saxon times), ant. mkt. tn. of Devon, England, on the R. Dart, with elder breweries, a milk factory, sawmills, and timber-yards. The grammar school was founded in 1553. There is a Norman castle, and the Guildhall also dates from 1553. Pop. 5534.

Tottenham, municipal bor. of Middx, England, near the borders of London and Essex, on the road from London to Waltham Cross. It was a royal manor in

the Middle Ages; was much developed at the end of the 19th cent. by working-class overflow, especially from Stoke Newington, and is now an industrial and residential dist. Bruce Castle, near the par. church, is a fine late Elizabethan manor-house, now a museum of postal history (Rowland Hill (q.v.) and his brothers once owned the house). T. returns 1 member to parliament. Pop. 123,200.

Tottington, urb. dist. of Lancs, England, 2½ m. NW. of Bury. Its industries are cotton-spinning and weaving, and production of rayon silk. Pop. 6000.

Toucans, popular name of any bird of the genus *Ramphastos*, often applied to the whole family *Ramphastidae*. They are all natives of tropical America and are characterised by their enormous bill and by their habit of bringing up their food after swallowing it in order to masticate it. In confinement they are almost omnivorous, but in a wild state they live chiefly on fruit, seeds, and insects. In the true T. the ground colour of the plumage is generally black; the throat, breast, and rump adorned with yellow, red, and white; the body is short and thick; tail rounded or even and capable of being turned up over the back when the bird goes to roost.

Touch, sensation due to the stimuli of pressure and contact acting on the body. There are 2 components of this sensation, one of simple pressure, and the other of the locality or region of application of the pressure. Sensitivity to pressure may be estimated by the ability to perceive the pressure due to small weights, from 2 to 15 milligrams, on various parts of the body. Results show that the sensitivity of these parts varies considerably, parts of the face being most sensitive. Ability to perceive locality is measured by the minimum distance separating the 2 slightly blunt points of dividers when they can be felt as 2 separate points. In parts of the back, forearm, and thigh the 2 points are felt as one, even when they are 2 in. apart. The tip of the tongue is most sensitive to locality, points 1 mm. apart being distinguished separately. The peripheral nerves supplying the skin terminate either on or between epithelial cells, or in special corpuscles. Certain of these have long been regarded as tactile organs, but there is conflicting evidence with regard to this view. Although careful experiment has failed definitely to establish the connection between the corpuscles and the sensation of T., results seem to indicate that T. must be due to special nerve endings probably associated with the corpuscles. Like all other sensations, that of T. is perceived by the brain, and is conveyed to it by afferent nerves or fibres which travel in special tracts of the spinal cord distinct from those conveying impulses of pain. Consequently in *syngo-myelia*, when the sensation of pain is lost, that of T. is unimpaired. See NERVOUS SYSTEM.

Touch-Me-Not, see IMPATIENS.

Touchstone, mineral (schist or jasper), also known as basanite, hydian stone, and

Flinty slate, is a siliceous stone, black or very dark coloured, used for testing the purity of gold, gold alloys, and other precious metals, which leave characteristic streaks when rubbed over it. The test is probably over 2000 years old and is still used.

'Tough School,' see HEMINGWAY.

Toul, Fr. tn, cap. of an arron., in the dept of Meurthe-et-Moselle, on the Moselle and the Marne-Rhine canal. It is an anct fort. tn, and was long a bishopric. Taken by the French from the Germans in 1552, it was finally ceded to France in 1648 (see WESTPHALIA, TREATY OF). The fine church of St-Étienne, built between 965 and 1496, was damaged in the Second World War. Pottery is manuf. Pop. 9000.

Toulon (anct Telo Martius), Fr. seaport in the dept of Var, on the Mediterranean, 29 m. ESE. of Marseilles. It became the seat of a bishopric in the 6th cent. In 1793, at the beginning of the Fr. Revolution, it was surrendered to the English by the royalists, but was retaken by the republicans in Dec. of the same year; during this memorable siege the young Bonaparte (see NAPOLEON I) first distinguished himself. In modern times T. has been an important naval station and arsenal. In 1911 the battleship *Liberté* caught fire and blew up in the harbour; many ships near by were damaged and some 200 persons perished. During the Second World War, in 1942, the bulk of the Fr. fleet was scuttled in T. harbour to prevent it falling into Ger. hands. Subsequent Allied bombing almost completely destroyed the harbour (by then a Ger. submarine base) and its installations. The tn was taken by Fr. troops in Aug. 1945. The fine roadstead of T. (with inner and outer bays separated by a breakwater) is backed by fortified limestone heights. There are marine engineering, armament, chemical, oil, and textile industries. Pop. 141,150. See G. Lambert, *Histoire de Toulon*, 1886-92; J. H. Rose, *Lord Hood and the Defence of Toulon*, 1922.

Toulouse, Count of, see RAYMOND.

Toulouse (Rom. Tolosa), Fr. tn, cap. of the dept of Haute-Garonne, on the Garonne. It was the anct cap. of Languedoc (q.v.). A Celto-Ligurian (see CELTS; LIGURIA) settlement, it was colonised by the Romans in 106 BC. In 419 it became the cap. of the Visigoths (see under GOTHs), and in 506 became cap. of Aquitaine (q.v.). Simon IV de Montfort (see under MONTFORT) was killed in 1218 while besieging the tn during the campaign against the Albigenses (q.v.). The last action of the Peninsular War (q.v.) was fought here in 1814. T. is the fourth city of France, a centre of communications, and the seat of an archbishopric and of a university. The anct abbey church of St-Sernin is probably the finest Romanesque church in France. There are sev. other remarkable churches, including the cathedral of St-Étienne which is partly 12th cent. There are museums, art galleries, and libraries, and the tn is a publishing and banking centre. A 16th-17th-cent. bridge joins it to the

W. suburb of St-Cyprien. T. has armament, chemical, footwear, metallurgical, textile, and flour industries, and a large trade in agric. produce. Pop. 268,900. See J. de Lahondès, *Les Monuments de Toulouse*, 1924.

Toulouse-Lautrec-Monfa, Count Henri Marie Raymond de (1864-1901), Fr. painter, b. Albi. An accident in early life (1878) broke his legs and prevented their normal growth. He turned, in compensation, from aristocratic country life to painting and the contemplation of the amusements and vices of Paris. His prolific period was between 1885 and 1899, 2 famous studies of the Moulin Rouge and its denizens belonging to 1892. He visited England in 1895. Strongly influenced by Degas, he is more of a social commentator than that master. He painted with verve, but perhaps his best work is graphic, notably in the brilliant posters he himself lithographed in colour for various Parisian resorts and in his series of drawings *Au Cirque*. See studies by G. Coquiott, 1921; M. Joyant (2 vols.), 1926, 1927; J. Lassaingne, 1939.

Touquet-Paris-Plage, Le, Fr. seaside resort in the dept of Pas-de-Calais, on the Eng. Channel. It has excellent bathing, and is a fashionable sporting centre with a racecourse and polo ground. Pop. 3200.

Touraco, or Touracou, beautiful African bird of the genus *Turacus* of the family *Musophagidae* or plantain-eaters. The T. has a small high bill, notched and serrated mandibles, short rounded wings, and a long rounded tail. It has an erectile crest on the head. The plumage is green, with purple on the wings and tail. The T.s comprise over 20 species, including the *Turacus persa*, with purple wing coverts, found on the Guinea Coast, and *T. albicristatus* or white-crested T. of Cape Colony.

Touraine, anct prov. of France, now the dept of Indre-et-Loire and a part of Vienne. Its cap. was Tours (q.v.), and it was named from the local Gallic tribe of the Turones. With Anjou and Orléanais (q.v.), it was a source of dispute between France and England. It came to England with Henry II in 1154, and was regained for France by Joan of Arc (q.v.). See A. Macdonnell, *Touraine and its Story*, 1906; A. H. Brodrick (ed.), *Touraine, with Anjou and Maine*, 1948.

Tourcoing, Fr. tn in the dept of Nord, 8 m. NE. of Lille. It was the scene of a Fr. victory over the Austrians in 1794. It has an important textile industry (dating from the 12th cent.), and forms part of the T.-Lille-Roubaix industrial complex. Pop. 83,500.

Tourguenieff or Tourgueniev, see TURGENEV.

Tourmaline, mineral of variable composition, containing silica, aluminium, sodium, iron, magnesium, boron, etc. It crystallises in the hexagonal system, and has a rhombohedral cleavage. It also occurs massive and compact and in radiate fibrous masses. In colour it is generally black, more rarely green, blue, and red, and, still more rarely, colourless. The

black variety is termed schorl (q.v.). The mineral is dioroid, brittle, and pyroelectric. On account of its hardness (7.5; sp. gr. 3) it is sometimes cut as a gem. Varieties of T. are rubellite (red or pink), indicolite (indigo blue), Brazilian sapphire (Berlin blue and transparent), Brazilian emerald (green), and peridot of Ceylon (yellow). T. occurs in granite, gneiss, mica, and chlorite slates and granular limestones; it is found in Cornwall and Devon, Bavaria, and Switzerland. The rubellite variety, used as gems, is found in Ceylon, Siberia, and Ava. The transparent varieties are used for making polariscopes and polarimeters, e.g. the T. pincette.

Tournai (Flem. Doornik), tn in the prov. of Hainaut, Belgium, situated on the R. Scheldt, 27 m. WNW. of Mons. It is an important railway junction. Of all the Belgian tns T. suffered most during the Second World War. Many houses, medieval churches, and municipal buildings, and the valuable library were destroyed. The fine Romanesque and Gothic cathedral, built from the 11th to the 14th cents., however, and the Belfry, the oldest in the country, were hardly damaged. There are quarries of freestone and limestone, and the chief manufs. are Brussels carpets, pottery, and woollen and cotton goods. Pop. (1955) 33,100.

Tournament, Tourney, or Joust, form of martial sport very popular in the Middle Ages. Combats took place on horseback between men of noble rank, and a prize was given by the lady of the T. to the knight who had displayed the greatest prowess. The custom was introduced into England from France during the 11th cent. T.s were regulated by definite rules and by very strict etiquette. The weapons used, spears, lances, swords, or daggers, had to be blunted. Each jouster was attended by his squire, who acted as his second and could alone touch him if he fell. In spite of precautions, however, accidents and rough dealings were not infrequent. In its earlier form the T. often took the form of a private war; it was more than once banned (though ineffectively) by the Church, e.g. at the Councils of Clermont (1130) and the Lateran (1179). See F. H. Cripps-Day, *History of the Tournament*, 1918.

Tournefort, Joseph Pitton de (1656-1708), Fr. botanist, b. Aix, Provence, prof. of botany at the Jardin des Plantes, in 1683. His *Éléments de Botanique*, 1694, embodies a systematic arrangement of some 8000 species of plants, classified, mainly, according to the corolla, a system for long adopted on the Continent. His chief work was his *Institutiones Rei Herbariae* (3 vols.), 1700, which prepared the way for Linnaeus, whose system of classification eventually superseded that of T.

Tourneur or Turnour or Turner, Cyril (c. 1575-1626), Brit. poet and dramatist. Very little is known of his life. He was a soldier much of the time, served in the Low Countries, accompanied Sir Edward Cecil's expedition to Cadiz, and d. on his return at Kinsale, Ireland. In the 6 years which he devoted to litera-

ture T. was a prolific writer. He wrote the *Atheist's Tragedy*, 1611, *Transformed Metamorphosis*, which was discovered only in 1872, and a lost play, *The Nobleman*. T.'s masterpiece is the *Revenger's Tragedy*, 1607. If it is true that T., unlike Shakespeare, was concerned rather with the technique of horror, physical and mental, than with psychological issues, it must be emphasised that, like Shakespeare, he sought to 'hold the mirror up to nature'; and he was perhaps the first Eng. writer to display the 'indifference' exemplified by Tchekov and his view that 'Man will become better only when you make him see what he is like.' Eng. drama owes much to T. for the admirable construction of his work, free from mannerism and bombast. His works were ed. by J. C. Collins in 1878; his 2 chief plays are reprinted in the Mermaid series and the *Revenger's Tragedy* in the Temple Dramatists. There is an ed. of his complete works by A. Nicholl, 1930. See A. C. Swinburne in *The Age of Shakespeare*, 1908; T. S. Eliot in *Elizabethan Essays*, 1934; U. M. Ellis-Fermor, *The Jacobean Drama*, 1936.

Tourniquet, instrument for preventing severe arterial haemorrhage by compressing the main artery of a limb. The usual form consists of 2 metallic plates, united by a thumbscrew, and a strap provided with a pad. The instrument is applied so that the pad is opposite the artery to be compressed, while the strap encircles the limb. By turning the thumbscrew the 2 metallic plates are gradually separated, so that the strap is drawn more tightly round the limb. A simple form of T. for first-aid purposes may be contrived by tying a triangular bandage about the part, introducing a stick between limb and bandage, and twisting until the required compression is obtained. A T. should not be left in position for more than ½ hr at a time, otherwise severe devitalisation of the tissues from lack of blood may occur and lead to gangrene. If it is necessary for a T. to remain in position for a long period it should be loosened for a few sec. every 30 min. and then re-applied. It is always advisable to tie a label of some kind to the patient and write on it the exact time at which the T. was first applied. This enables the hospital, or surgeon, or whoever it is into whose care the patient is delivered to see at a glance whether or not it is time for the T. to be loosened. This simple measure has saved many a limb from amputation as a result of gangrene.

Tournon, Fr. tn, cap. of an arron., in the dept of Ardèche, on the Rhône. It has a textile industry, and a trade in wines. Pop. 5800.

Tours, Fr. city, cap. of the dept of Indre-et-Loire, lying between the Loire and the Cher (qq.v.), 125 m. SW. of Paris. It was formerly the cap. of Touraine (q.v.). Known to the Romans as Caesarodunum, the tn passed to the Visigoths in the 5th cent. It developed in importance after the time of St Martin (q.v.), and it was here that St Gregory (q.v.) founded the abbey which was later

associated with the name of Alouin (q.v.) and which became one of the great centres of learning in the Middle Ages. Near T. in 732 Charles Martel (q.v.) stopped the advance of the Saracens. A silk industry was estab. by Louis XI, but it declined after the revocation of the Edict of Nantes (q.v.), since most of the craftsmen were Huguenots. During the siege of Paris in 1870, T. was the seat of the Fr. Gov., and it was again the seat of the gov. for 4 days in 1940 during the Second World War; it suffered much damage during the War. The archiepiscopal cathedral (13th-16th cents.) has fine glass and cloisters. There is an archiepiscopal palace (17th-18th cents.), now a museum, and there are some notable anc. houses. Machinery, textiles, and chemicals are manuf., there is a publishing industry, and there is a trade in agric. produce, fruit, wines, and spirits. Clouet, Jean Fouquet, and Balzac were natives. Pop. 83,700.

Tours, Battle of, see under CHARLES MARTEL.

Tourville, Anne Hilarion de Contetin, Comte de (1642-1701), Fr. adm. and marshal of France, b. Normandy, distinguished himself in the battle of Palermo against the combined fleets of the Dutch and Spaniards (1676). But his most famous victory was won in 1690 off Beachy Head against the Dutch and English. The enemy, however, retrieved this disaster in 1692, when T. suffered defeat at La Hogue.

Toussaint, Anna Louisa Geertruida, see BOSBOOM.

Toussaint L'Ouverture, Pierre Dominique (1744-1803), Negro liberator of Haiti (q.v.), b. Haiti, son of a chieftain of Gulaou-Guinou, W. Africa, whom slave-traders captured and brought to Haiti. He was baptised and learned to read. He read and was markedly influenced by the Abbé Raynal's *Philosophical and Political History of the European Establishments and Commerce in the Two Indies*, where it was emphasised that the slaves were treated worse than dogs. Having joined the rebels, he soon acquired a magnetic hold over the negroes; his literacy lent him prestige, his knowledge of plants the reputation of a witch doctor, his dignity of bearing commanded their respect, and by 1791 he was their leader. T. and his army, then 6000 strong, allied themselves with Spain and carried out a lightning campaign.

In France, with the progress of the revolution of equality, came a change of heart towards Haiti, and 3 delegates from the is. now took their seats in the Fr. National Assembly (1793), while slavery was declared abolished. Thus T. was now able to lead his fellow negroes under the banner of the Fr. Rep. against both the Spanish and the English, the latter having intervened on behalf of the white planters. Though without military allies, and alone, he fought the English, who sustained their worst defeat for many years and soon had to yield all the positions they had won. T. entered Port-au-Prince in triumph.

In France reaction now set in. Van-blanc, in the Convention, demanded that help be given to the whites against the aggression of the negroes, but T. defeated both the mulattoes under Rigaud and the Spanish. During 1801-2 T. was the ruler of the whole is., and began to reorganise the administration in the Sp. colony as he had done in Haiti.

At this point, however, Napoleon intervened in an attempt to recover the slaves to their former bondage, and T. then took up arms against his former Fr. allies. T. refused to negotiate with Napoleon's commissioner, and stipulated that he himself should be made governor of Haiti for life. Napoleon retorted by making extensive preparations for war. Following the Peace of Amiens (1802), Napoleon openly announced an expedition against Haiti, whose slaves had 'flouted France's authority'. In the end T. could not rely on his general staff, and had no choice but to accept peace. He was inveigled into pourparlers with the Fr. leaders and at once put on board a frigate for France. There he was confined in the castle of Joux, a cold, elevated spot near the Swiss frontier. Through the studied neglect of his jailers he died there in less than a year.

See P. Sannon, *Histoire de Toussaint L'Ouverture*, 1920; C. L. R. James, *The Black Jacobin*, 1938; J. Koringold, *Citizen Toussaint*, 1944; S. Alexis, *Black Liberator: The Life of Toussaint L'Ouverture*, 1949.

Tout, Thomas Frederick (1855-1929), historian, b. London. Educ. St Olave's School, Southwark, and Balliol College, Oxford, he became prof. of hist. at St David's College, Lampeter, 1881-90, and at Manchester Univ., 1890-1925. He was president of the Royal Historical Society, 1925. His works include booklets on medieval subjects, and many articles in the *Dictionary of National Biography*. See also his *Collected Papers*, 1932-4. See memoir by Sir F. M. Powicke, 1931.

Tovey, Sir Donald Francis (1875-1940), composer, pianist, and scholar, b. Eton. From early childhood he was associated with Joachim (q.v.), who took a great interest in his musical education. T. entered Balliol College, Oxford, in 1894, and studied composition under Sir Walter Parratt and Sir Hubert Parry. From 1900-2 he gave concerts in London, Berlin, and Vienna, and from 1914 was Reid Prof. of Music at Edinburgh Univ. He conducted the Reid Orchestra, Edinburgh, founded in 1924. T.'s music is distinguished by high and serious aims, with marked regard for classic form and style, and as a pianist he was for some time in the front rank with his interpretations of Bach, Beethoven, and Brahms. As a teacher of music he was regarded with the greatest esteem. He wrote 40 articles for the 11th ed. of the *Ency. Brit.*, and others, on Brahms and Haydn, in *Cobbett's Cyclopedic Survey of Chamber Music*, *A Companion to Beethoven's piano sonatas*, 1931, and *A Companion to Bach's Art of Fugue*, 1931, and studies of Schubert, 1927, and Gluck, 1934, in H. Foss's *Heritage of Music*. His *Essays in Musical*

Analysis (6 vols.), 1935-8, were notes for performances by the Reid orchestra. See also his *Essays and Lectures on Music* (ed. by H. Foss), 1950.

Towcester, tn of Northants, England, 8 m. SSW. of Northampton, on Watling Street and known to the Romans as *Lactodorum*. T. has an anct par. church at which Archdeacon Wm Sponne (d. 1449) was rector for 28 years, during which time he founded the grammar school. The chief industry is light engineering, and there is an agric. trade. Some 4 m. SW. is Silverstone, with a notable motor-race track. Pop. 2441.

Tower and Extending Ladders. A ladder is a set of steps or rungs between supports, usually made of wood, but sometimes of metal (aluminium alloy and steel) or rope. Ladders were originally used in the anct world, e.g. for embarking or disembarking from the stern of a ship, or fixed to a wheeled platform, as an *escalade* for siege work. A simple form of E. L. is the scaling-ladder (q.v.), which consists of 2 or more loose sections, each of which fits into the other. Other types of ladder are the wheeled tower ladder for (e.g.) inspection of street lamps, and the self-supporting steelback ladder for use when the surface of a building is not to be touched. For fire 'escapes' and turntable ladders, see under FIRE BRIGADES AND FIRE FIGHTING.

Construction. The construction of a telescopic extending ladder, which is typical, is here described. The stiles of a ladder are of 2 kinds: deal sides cut from deals, or pole sides, formed by cutting a straight fir-pole in half and using one half for each side. Douglas fir is also used for stiles at the present time; oak and ash are employed for the rungs or rounds. Stile-lengths, having been brought to the correct size are 'paired-up,' so that stiles with the same grain tendencies are matched together. Stiles are then mortised for fitting with oblong rungs or drilled for round rungs, and are next grooved to take a wire reinforcement. Stiles and rungs are then glued or wedged together. To rebate the wire into the grooves the ladder is bent at the centre with weights and a tautened rope, the wire is fixed to one end of the stile and held away from the groove by draw-arms; the rope and weights are released at the centre and the wire allowed to fall into the grooves.

Tower Bridge, the easternmost bridge over the R. Thames, built in 1886-94. It was designed by Sir Horace Jones and Sir J. Wolfe Barry and it cost the city corporation £1,500,000. It has 2 high Gothic towers 200 ft apart, and is connected with either bank by single-span suspension bridges. The span between the towers in the centre of the river consists of a pair of drawbridges, or bascules, which can be raised in 1½ min., and thus permit the passage of vessels, whilst high up near the top of the towers there is a permanent suspension-bridge for pedestrians, no longer open.

Tower Hamlets, before 1918, a parl. bor. of E. London, returning 7 members and,

so called because of their proximity to the T. of London. The divs. were Bow and Bromley, Limehouse, Mile End, Poplar, St George, Stepney, and Whitechapel.

Tower Mills, see WINDMILLS.

Tower of London, the most historic building in the U.K., connected intimately with the tragic side of Eng. hist. because of the long roll of state prisoners lodged there, so many of whom were executed within or without its walls. It was first built by William the Conqueror to protect and control the city. His building, the Great Tower or Keep, generally called the White Tower, is the oldest part of the T. of L., and lay within the Rom. walled city. Enlargement in the 12th cent. carried the buildings beyond the wall. Part of the Tower therefore lies outside the city, but it forms a Liberty in itself. Considerable successive additions and alterations have been made to the buildings, and they exhibit a variety of architectural styles from the 11th to the 20th cents. The inner ward is defended by a wall flanked by 13 towers. The outer ward is defended by another wall, flanked by 6 towers on the S. or riv. side and by bastions on the NW. and NE., the whole surrounded by a moat, now empty. At the SW. angle there were originally 3 drawbridges (none survives) and 3 towers (2 survive) before entrance could be gained to the outer ward.

The T. of L. has been a fortress, a palace, a prison, has housed the public records, the Royal Mint, the royal menagerie (from 13th or 14th cent. until 1834), the Royal Observatory (for a short time), and was for cents. the arsenal for small arms. It is now a museum of armour, in a limited sense a fortress (it has a military garrison), the repository of the Crown Jewels, and the greatest showpiece of London. As a palace (the palace buildings have not survived), it was used by all sovereigns down to James I. By custom each sovereign lodged in the T. before coronation and then rode in procession through the city to Westminster. As a prison it was used from the earliest times.

The White T. houses the wonderful Armouries, and contains the perfect little Chapel of St John, the earliest Norman building in London. In the NW. corner of the inner ward is the Chapel of St Peter ad Vincula, rebuilt in 1512 after a fire, where many famous people executed after incarceration in the T. are buried, among them Anne Boleyn, Sir Thomas More, Lady Jane Grey, the Earl of Essex, and Monmouth. The space S. of the chapel, Tower Green, is where executions took place within the Tower. The Bloody Tower, built by Henry III and so named because of its tragic associations, is believed to be the scene of the murder of the young princes Edward V and his brother the Duke of York. Raleigh was in this tower for 13 years. Adjoining it is the Wakefield Tower, also built by Henry III, which houses the Crown Jewels. On its W. side there formerly stood the Great Hall, pulled down during

the Commonwealth, where Anne Boleyn was tried. The Beauchamp Tower, built probably in Henry III's reign, contains the inscriptions of many famous prisoners. The famous Traitors' Gate, under St Thomas' Tower, originally a useful river-entrance to the Tower, later became a convenient landing-place for prisoners tried at Westminster. On Tower Hill, NW. of the Tower, a permanent scaffold was erected in 1465, though the first recorded execution had taken place in 1388, and the last, that of Simon Fraser, Lord Lovat, was in 1747. See also YEOMEN OF THE GUARD.

See W. G. Bell, *The Tower of London*, 1935; H.M.S.O., *The Tower of London*, 1948; Col. E. H. Carkeet-James, *Her Majesty's Tower of London*, 1953.

Town and Country Planning. Though many ancient and medieval towns, many towns in colonies of European nations, and a few modern towns were originally laid out on definite plans (often by powerful rulers for military or political reasons), the majority were not. And even where there was originally a plan, there was no continuous control of changes in and extensions of towns, except in a few large estates developed by private landowners on a leasehold basis. In most countries land is held in parcels of varying sizes by many owners, and the siting and character of buildings have been matters of individual enterprise. Villages grew into towns, and towns into great cities without any overall consideration of the total results. In Great Britain and other industrialised countries the vast modern increase of production and wealth has been accompanied in many towns by a grave congestion and disorder of dwellings, work-places, and other buildings, injurious to health and living conditions. And the reaction against urban congestion, especially in the greater cities, made possible by new means of transport, has led to suburban extensions on a vast scale. Masses of unfit and crowded dwellings remain in city centres; the spacious surroundings of suburban life are offset by long journeys between home and work; and much of the countryside near the cities is depreciated by ill-placed buildings. Traffic congestion and shortages of space for recreation, schools, and car-parking have become common complaints in the towns, and spoliation of rural areas a frequent complaint outside them. Recognition that public control of the use of land is necessary to deal with these evils has come slowly. But it is now generally agreed in all countries, especially where rising standards are demanded for houses, schools, factories, public buildings, shops, roads, sports, entertainment and cultural facilities, and airfields, that the demands cannot be met or properly adjusted without a considerable measure of public planning control.

These are the reasons for the emergence of T. and C. P. as a new branch of government. There were foreshadowings of it in laws and byelaws regulating streets and space about buildings, in public-health laws, and in local public efforts for town

improvements. But legislation for town planning in the modern sense came into vogue only in the 1860s and 1870s, beginning in Italy, Sweden, Austria, and Germany with laws to control the lay-out of suburban extensions, and spreading to Great Britain, the U.S.A., and other countries. In Great Britain its first appearance was in the Housing, Town Planning, etc., Act of 1909, which gave permissive powers to certain local authorities to prepare and apply plans, subject to ministerial approval, for areas in course of or prospect of development. In 1919 planning for similar areas became obligatory on local authorities with populations of 20,000 or over, and by Acts of 1925 and 1932 the powers were extended to all counties, districts, and county boroughs, and from 1932 could be applied also to the parts of towns already built up. Though some useful control was exercised, chiefly in new suburban areas, under these Acts, and useful experience was gained, they proved inadequate to ensure the right placing of new development or to promote good redevelopment. In general, the planning areas were found to be too small, and few of the authorities were in a position to meet the costs of compensation that would have arisen from desirable restrictions or prohibitions of development.

Growing realisation that more comprehensive measures were needed prompted the appointment in 1937 of the *Royal Commission on the Distribution of Population*, whose report (the Barlow Report) in 1940 recommended the planned redevelopment of congested areas of cities, the dispersal of part of their industry and population to garden cities and smaller towns, the promotion of a better balance of employment throughout the country, and a national authority to give effect to these proposals. Following this report, that of the Scott Committee on *Land Utilization in Rural Areas*, 1942, while accepting its general thesis, stressed the importance of safeguarding good agricultural land and countryside amenities; and that of the Uthwatt Committee on *Compensation and Betterment*, 1942, proposed stronger powers for the public acquisition of land and a drastic solution of the compensation problem. These 3 reports, along with the special problems created by extensive war damage in many towns, led to an entirely new conception of national T. and C. P.

In 1943 all land in Great Britain was brought under 'interim planning control,' so that pending the preparation of official plans owners were required to obtain consent from the local planning authority for any proposed developments; and an Act of 1944 gave urban authorities positive powers to acquire, re-plan, and rebuild areas of extensive war damage or of bad lay-out or obsolete development.

These and previous Acts were almost wholly replaced by the T. and C. P. Acts of 1947, for England and Wales and for Scotland, which are now the basis of the British planning system. They revolutionised administration and procedure. Planning powers exercised in England

and Wales by dist. councils and all boras, were now transferred to co. councils and co. bor. councils, with permissive delegation of detailed administration to the smaller authorities. In Scotland the powers are exercised by the large burghs, the co. councils, and the 2 small burghs of St Andrews and Thurso. Every planning authority has to prepare within 3 years a full survey of physical and other resources and existing development, and a development plan for its area, and to revise these each 5 years, all plans being subject to approval, in England and Wales by the Ministry of Housing and Local Gov., and in Scotland by the Dept of Health for Scotland (*see ZONING*). The public must be enabled to see the draft plans, and the Ministers must consider local objections. Many public inquiries have been held into these objections, and most of the first series of plans have now been approved, with some Ministerial revisions.

Planning permission must be sought for all proposed developments, including changes of use of land or premises thereon, and the construction or alteration of buildings, roads, etc.—with the exception of farm buildings and minor alterations under General Development Orders. The would-be developer has a right of appeal to the Minister against a decision of the planning authority, and in important cases public inquiries into individual objections may be held.

The T. and C. P. Acts of 1947 also give powers to public authorities to acquire and develop land for planning purposes, and to retain or lease it, and provide for gov. grants for these purposes. The development plans have to define the land likely to be required within 10 years for public purposes. An owner is entitled to require the authority to purchase his land if planning restrictions deprive him of its value. Normally compensation at existing-use value is payable for land acquired or depreciated by restrictions. The provisions in the 1947 Acts for 'global' compensation from a national fund for the prohibition of development on undeveloped land have been considerably modified by the T. and C. P. Act 1954, and the 'development charge' originally payable when financially advantageous development was sanctioned has disappeared. The position now is, briefly, that on public acquisition of land the owner is entitled to compensation (a) for his existing-use value at current market price, plus (b) the 1947 value of his prospective development right. Certain anomalies resulting from this are stimulating a demand for further amending legislation from owners on the ground that full market value would be fair, and from others on the ground that owners ought not to benefit by increments of value due primarily to public action.

Other important provisions of the 1947 Acts are for the control of outdoor advertisement (*see ADVERTISEMENT*), for preserving buildings of architectural or historic interest, and for preserving trees

and woodlands. Conditions for the restoration of land may be imposed where permission is given for mineral workings.

The Acts also provide that applications for consent for building factories or extensions in excess of 5000 sq. ft must be supported by Board of Trade certificates that the proposals are 'consistent with the proper distribution of industry.' (The Board also has powers of planning importance under the Distribution of Industry Acts, 1945 and 1950, for assisting the estab. of factories in areas of potential unemployment, and checking industrial development in congested cities.) *See INDUSTRIAL TRADING ESTATES*.

The aim of British post-war planning is to balance the rival claims of agriculture, industry, housing, public services, military developments, mineral workings, etc., so as to secure that land is used in the best interests of the community at large with the least possible hardship to personal interests. The national policy is now to stop the growth of London and other over-large conurbations, to reduce their congestion on rebuilding, to safeguard good agricultural land, to reserve green belts around tns, and to disperse 'overspills' of persons and employment to new tns and smaller existing tns. Post-war concentration on new housing to relieve the shortage has delayed slum clearance and central reconstruction, except in a few heavily war-damaged cities. By 1956 the accent was on rehabilitation and reconstruction within the cities, with much debate as to how to provide adequately for the 'overspill' if the rebuilding is to be on satisfactory standards of housing density and open space (*see NEW TOWNS; GREEN BELTS; OPEN SPACES*).

Though the necessity of much dispersal is generally accepted, planning theorists differ as to its scale and as to the permissible density of redevelopment within large tns. Some follow the Swiss architect Le Corbusier (q.v.) in favouring very high blocks of flats having shops and other community facilities within the blocks. Some contend that multi-storey flats at high density would reduce journeys to work and the need of dispersal; they are supported by others who fear that dispersal would absorb too much agricultural land. Others, again, argue for terrace housing at high densities with very small gardens. Advocates of dispersal reply that flats are acceptable only to a small minority (5-10 per cent); that they are very costly and involve huge housing subsidies that might be better spent on agricultural improvements; that the utmost conceivable compression of housing could not economise $\frac{1}{4}$ of 1 per cent of farm land; and that the value per housing ac. of food from gardens at low density exceeds that from an average farm ac. Ultimately the resolution of these warring views depends upon effective public opinion.

Planning Associations. The T. and C. P. Association (28 King Street, London, W.C.2), a voluntary society open to anyone interested, has since 1899 consistently

advocated the policy of city decongestion, green belts, and dispersal to new towns, etc. (see GARDEN CITIES). The National Housing and Town Planning Council (42 Devonshire Street, London, W.1) represents most of the local authorities concerned with these subjects. The Town Planning Institute is the chief professional body granting qualifications for planning. Several univs. and other professional institutions also grant degrees and qualifications. The Councils for the Preservation of Rural England, Wales, and Scotland, with their many county branches, maintain a close watch on prospective developments in the countryside.

Town Planning Abroad. In most countries of Europe, the Brit. Commonwealth, the U.S.A., and S. America planning laws analogous to though mostly less complete than those of Great Britain are now in operation. In Soviet Russia and other Communist countries, where land and most industries are nationalised, the system of control is very different, but there are similar problems of excessive urban concentration; as there are also in India, Japan, and other Asian states, where planning legislation is at an earlier phase of evolution. In Germany and Sweden extensive ownership of land by cities has facilitated planned development; in Germany also an age-old municipal control of building pre-dated planning in producing some harmony and order; yet the great cities exhibit the usual defects. Next to Great Britain, the Netherlands has perhaps the most comprehensive national planning in W. states; but the over-building in 'Conurbation Holland' gives great concern. The International Federation for Housing and Town Planning (offices at The Hague) brings together planners from all countries for congresses in different capitals, and is an important means of exchange of experience and ideas. The United Nations Economic and Social Council (E.C.O.S.O.C.) also contributes to such exchange. There is a constant flow of visiting experts between countries, particularly to Great Britain, to study its recent developments in law and policy.

See Sir Patrick Abercrombie, *Greater London Plan*, 1944; E. J. Rimmer (ed.), *Encyclopaedia of Planning Law*, 1949; B. J. Collins, *Development Plans Explained* (H.M.S.O.), 1951; L. B. Keeble, *Principles and Practice of Town and Country Planning*, 1952; T. Sharp, F. Gibberd, and W. Holford, *Design in Town and Village*, 1953; W. Ashworth, *Genesis of Modern British Town Planning*, 1954; R. H. Best and J. T. Ward (Wye College), *The Garden Controversy*, 1956; P. Self, *Cities in Flood*, 1957; Town and Country Planning Acts, 1947 and 1954 (law books thereon); any local *Development Plan*, 1950 onwards; *Progress Report of Ministry of Town and Country Planning*, 1943-51 (H.M.S.O.), 1951; *Town and Country Planning in Britain* (Central Office of Information, Information Pamphlet), 1955; Ministry of Housing and Local Government *Report for 1955* (H.M.S.O.), 1956; *Town and Country Planning* (monthly); *Town Planning*

Review (quarterly); *News Sheet of International Federation for Housing and Town Planning* (quarterly).

Town Clerk, see OFFICERS OF LOCAL AUTHORITIES.

Town Council, in England the governing body of a municipal bor. or co. bor. (see BOROUGH). Where the particular tn is included in the co. area the co. council has overriding administrative powers in certain matters; but in the case of co. bors. the T. C. is practically independent of all other local governing authorities (see LOCAL GOVERNMENT). The T. C. consists of the mayor (q.v.), aldermen, and councillors. The qualifications for membership are either the ownership of freehold or leasehold property within the area of the authority or registration as a local gov. elector for the area or residence within the area during 12 months preceding the election. In addition, qualified persons must be Brit. subjects, and at least 21 years of age. There are certain disqualifications contained in the Local Gov. Act, 1933. The term of office is 3 years; one-third of the whole number of councillors of the bor. or of each ward thereof where the bor. is divided into wards (being those with the longest term of membership without re-election), retire in May every year and are eligible for re-election. Persons entitled to vote at an election of councillors are those who appear as local gov. electors on the register of electors for the area. The number of aldermen is one-third the number of councillors, and they are elected by the councillors from the members of the council or persons qualified to be councillors of the bor. The ordinary election of aldermen is held in every third year at the ann. meeting of the council in May, and takes place immediately after the election of the mayor. The mayor is elected annually by the council as the first business of the ann. meeting from persons who are, or who are qualified to be, members of the council. He is the civic head of the bor. and presides over the T. C. The provisions of the Local Government Act, 1933, govern the constitution and meetings of T. Cs. A T. C. must hold an ann. meeting and at least 3 other meetings yearly, which are to be as near as may be at regular intervals. Business cannot be transacted at meetings unless at least one-third of the whole number of members are present. Acts of the Council and all questions coming before the council are decided by a majority of such members as are present and vote. Thus, if there are 36 members of the council and 12 only are present, 7 of them could pass an effective resolution. Bor. councils usually meet monthly. The council can make standing orders for the regulation of their proceedings which may supplement statutory rules, but not be at variance with them. Except in the case of business required by law to be transacted at the ann. meeting no business can be transacted at a meeting of the council other than that specified in the summons relating thereto. See also LOCAL GOVERNMENT.

Towneley Plays, The, or Wakefield Mysteries, are 32 in number, and are believed to have been compiled by the friars of Widdikirk or Nostel in the 14th and rearranged in the 15th cent. As in the York plays, the various 'pageants' together dealt with the whole Bible story. The simple religious sentiment is by no means marred by the comic element, which never endangers the dignity of the whole. The cycle was ed. for the Surtees Society in 1836, and by G. England, and A. W. Pollard in 1897 for the Early Eng. Text Society. See E. F. Williams, *The Comic Element in the Wakefield Mysteries*, 1914; and M. Carey, *The Wakefield Group in the Towneley Cycle*, 1929. See also MIRACLE PLAY.

Townsend, Mrs Stephen, see BURNETT, FRANCES ELIZA HODGSON.

Townshend, Charles, second Viscount (1674-1738), statesman, b. Raynham Hall, Norfolk, and educ. at Eton and King's College, Cambridge. He was one of the commissioners for the Union with Scotland, was joint plenipotentiary with Marlborough at The Hague, and negotiated with Holland the Barrier Treaty. Dismissed in 1712 on the formation of the Harley ministry, he kept up a correspondence with the court of Hanover, secured the confidence of George I, and on the latter's accession was appointed secretary of state of the N. Dept. He lost favour in 1716, but in 1720 he was President of the Council under Stanhope, and on Stanhope's death (1721) became again secretary of state, a position he held until 1730, when he retired into private life. He encouraged turnip growing and greatly improved the rotation of crops, being known as 'Turnip Townshend'.

Townshend, Sir Charles Vere Ferrers (1861-1924), soldier, b. Raynham, Norfolk; entered the Marines in 1881. As capt. in the Indian Army he led the march to Chitral, Jan. 1895; he commanded there during the siege, and was made C.B. He saw service in Egypt and Africa. In April 1915 'T.' was appointed to command the 6th Div. in Mesopotamia. He proceeded from Basra over flooded country, with barges, reaching Amara, 1 June. He captured Kut in Sept. Fighting Nured-Din at Ctesiphon, 22 Nov. he had to fall back on Kut, was besieged there, and surrendered 29 April, 1916. In 1920 he pub. *My Campaign in Mesopotamia*. He was Independent M.P. for Wrekin, 1920-2. See also KUT AL AMARA. See E. Sherson, *Townshend of Chitral and Kut*, 1928.

Townshend, George, fourth Viscount and first Marquess (1724-1807), soldier, brother of Charles T. (1725-67). He took part in the battles of Dettingen (1743), Fontenoy (1745), Culloden (1746), and Laffeldt (1747). At Quebec he took command after the fall of Wolfe. From 1767 to 1772 he was Lord Lieutenant of Ireland, and from 1783 to 1834 Master General of the Ordnance. He was made a F.M. in 1796. See Sir C. Townshend, his great-great-grandson, *Military Life of Field-Marshal George Townshend*, 1901.

Townshend, Meredith White (1831-1911), journalist, b. London. Educ. at

Queen Elizabeth's Grammar School, Ipswich, he became a schoolmaster, but later went to India and became editor and proprietor of *The Friend of India*. In 1859 he returned to England and in 1861 bought the *Spectator* (q.v.), which he ed. in conjunction with R. H. Hutton (q.v.) till the latter's death in 1897. J. St. Loe Strachey, the succeeding editor, declared that T. 'was, in the matter of style, the greatest leader-writer who has ever appeared in the Eng. Press.'

Township, or Vill, originally probably a group of allodial proprietors united by community of agric. interests, the chief officer of which was the tn-reeve. The T. is almost certainly one of the antecedents of the medieval bor. The term is not now in common use, but until recently meant legally a tn containing more than 1 parishioner. In some areas (e.g. Liverpool) the pars are still termed T.s, e.g. the T. of Everton. also LOCAL GOVERNMENT.

Townsville, city and port of Queensland, Australia, 832 m. by rail N. of Brisbane. It is the outlet and chief commercial and administrative centre for a large section of N. Queensland, and the chief port through which sugar, wool, meat (chilled, frozen, and canned), meat-works by-products, sheep, cattle, minerals, coal, silver, lead, zinc concentrates, copper, and gold are exported. Pop. 41,200.

Towse, Sir Beachcroft (1864-1948), Brit. soldier and president of the National Institute of the Blind. Although originally intended for a naval career, he went to Wellington College and, in 1885, was gazetted to the Gordon Highlanders, with whom he served in Egypt, Malta, and India. He was with the Chitral Relief Force, and was at the storming of the Malakand (q.v.) Pass. In 1899 he went with his regiment to S. Africa, where he was awarded the Victoria Cross, was severely wounded, and lost his sight. In 1901 he joined the council of the National Institute for the Blind, of which he became chairman in 1921, and imbued all those whom he met suffering from his own disability with his maxim 'Blindness can either master a man or a man can master blindness.' He converted his house at Goring into the first of the Institute's homes of rehabilitation for the blind. Through ill health he resigned the chairmanship in 1944, but continued to take great interest in every aspect of the welfare of the blind.

Towton, par. in the W. Riding of Yorks, England, midway between Leeds and York, the scene of the Yorkist victory of 1461. Pop. 134.

Towy, riv. of Wales, rising in the hills between Cardiganshire and Radnorshire. It flows on a southerly course, passing by Llandovery and Carmarthen, and enters Carmarthen Bay at Llanstephan. Length 66 m.

Towyn, urb. dist. and seaside resort of Merioneth, Wales, situated on Cardigan Bay, 12 m. N. of Aberystwyth. Its church of St. Cadvan is the largest and most interesting example of Norman

architecture (1150-1200) in Merioneth. Within it is preserved an inscribed stone dated by experts as c. 680 and accordingly considered to be probably the most ancient monument of the Welsh language. Pop. 4491.

Toxaemia, the presence of toxins (poisons) in the blood. The term is generally used to mean the presence of toxins due to absorption from a local infection. The toxaemia from diphtheria (q.v.) and tetanus (q.v.) are examples (see PYAEMIA).

Toxaemia of Pregnancy, see PREGNANCY.

Toxicology, science dealing with poisons. Its main branches deal with the chemical nature of poisons, their origin and preparation; their physiological action and the tests by means of which their presence may be detected; the pathological changes due to their presence and the recognition of them by post-mortem evidences; their chemical reactions with a view to the determination of antidote and the physiological action of the latter. Poisons may act on various organs and systems of the body. Acids and alkalis are corrosive to the alimentary tract; carbon monoxide reduces the oxygen-carrying capacity of the blood by combining with haemoglobin; digitalis affects the heart; strychnine the medulla and spinal cord. A tolerance is acquired to some substances such as opium, which can ultimately be taken in doses which would initially prove fatal. Certain poisons, such as salts of heavy metals, may accumulate slowly in the body and finally prove toxic in their action. Toxins are produced by pathogenic bacteria, and injections of such toxins, or of toxoids prepared from them, are used in the production of immunity, e.g. to diphtheria. The number of poisons is very large; almost any substance may be dangerous if taken in sufficiently large amounts. See Sir S. Smith and F. S. Fiddes, *Forensic Medicine* (10th ed.), 1935; A. S. Taylor, *Principles and Practice of Medical Jurisprudence* (ed. by Sir S. Smith and K. Simpson, vol. 1), 1956. See also POISONS.

Toxophily, see ARCHERY.

Toy-dogs, diminutive breeds usually developed purely as pets. See GRIFFON BRUXELLOIS; KING CHARLES SPANIEL; MALTESE DOG; PAPILLON; PUG-DOG; YORKSHIRE TERRIER; BLACK-AND-TAN TERRIER; POMERANIAN.

Toynbee, Arnold (1852-83), economist and social reformer, b. London. He was intended first for the Army and then for the Bar, but ill health and literary activity prevented the following of either of these professions. He went to Oxford and finally gave himself up to the study of social and economic questions. He also did much practical work for the betterment of industrial conditions. In 1875 he went to Whitechapel where he joined in work with Canon Barnett. T. wrote various articles which were pub. posthumously as *Industrial Revolution in England* (5th ed. with memoir by B. Jowett), 1908. See lives by F. C. Montague, 1889; Viscount Milner, 1901; and

L. L. Price, *Political Economy in England*, 1891, for a criticism of Toynbee as an economist.

Toynbee, Arnold (1889-), historian, b. London, nephew of Arnold and Paget T. (qq.v.). Educ. at Winchester and Balliol College, Oxford, of which he became Fellow and tutor (1912-15). After attending the Peace Conference in Paris (1918) and serving for a short time as prof. of Byzantine and Modern Greek at London Univ., he became in 1925 director of studies at the then newly founded Institute of International Affairs (Chatham House). It is with this institution that his name is chiefly associated (see ROYAL INSTITUTE OF INTERNATIONAL AFFAIRS). There he has written contemporary hist. in the ann. *Survey of International Affairs*. The 10 volumes which comprise *A Study of History* (vols. 1-3, 1934, vols. 4-6, 1939, and vols. 6-10, 1954) form a standard work on the evolution of civilisations revealing great erudition in the treatment of ancient and modern historical problems. Abridgements of the work have been made by D. C. Somervell. Other works by T. are *Western Question in Greece and Italy*, 1922, *Greek Historical Thought*, 1924, *Greek Civilisation and Character*, 1924, *The World After the Peace Conference*, 1925, *A Journey to China*, 1931, *Christianity and Civilisation*, 1940, *Civilisation on Trial*, 1948, and *The World and the West*, 1953.

Toynbee, Joseph (1815-66), otologist (ear specialist), b. Heckington, Lincs. He studied particularly the pathology of the ear and pub. in 1860 his medical classic, *Diseases of the Ear*. He was appointed in 1857 aural surgeon to St Mary's Hospital, London, which was the first general hospital to establish an ear dept. T. died as a result of an experiment in which he inhaled chloroform and prussic acid to test its effect on tinnitus (noises) of the ear. 'Toynbee Hall' (Whitechapel), the first Univ. Settlement, was named after his son, Arnold Toynbee.

Toynbee, Paget (1855-1932), philologist, b. Wimbledon. Educ. at Haileybury and Balliol College, Oxford, he was a leading authority on Dante, having ed. *inter alia*, critical texts of the *Divina Commedia*, 1900, and of Dante's *Letters*, 1912-17; also written a *Life of Dante*, 1900. He ed. books in connection with Horace Walpole, including his *Reminiscences*, 1924.

Toynbee Hall, Whitechapel, the first Eng. univ. settlement, founded by Canon Barnett, rector of St Jude's, Whitechapel, and named after his friend and colleague Arnold Toynbee (1852-83) (q.v.). See SOCIAL SETTLEMENTS.

Toys, implying, in a general sense, children's playthings. T. can be traced back to very remote periods. The top is mentioned in Virgil in the seventh book of the *Aeneid*, and was probably introduced into England by the Romans. The Greeks appear to have played with different kinds of ball: the little ball, the great ball, and the empty ball, which was blown out like the modern football. There is a fine collection of early Rom. dolls in the

Musée du Louvre, Paris, of which a description is given in H. R. d'Allemagne's *Histoire de Jouets*, 1903, a book which deals very fully with dolls of different periods.

Trabzon, Trebie, or Trapezus, formerly Trebizond: 1. Il of Asiatic Turkey, on the S. coast of the Black Sea, heavily timbered and generally mountainous. Wheat and barley are grown and valuable timber produced. There are copper and zinc deposits. Area 16,671 sq. m.; pop. 463,918.

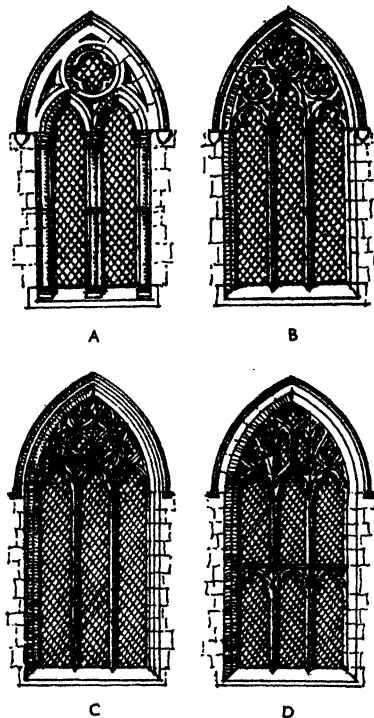
2. Cap. of the above, a port on the Black Sea, 108 m. NW. of Erzerum, formerly of great importance as an emporium for the wares of Kurdistan and Persia, but has lost much of its transit trade since the Batum-Tiflis Railway was opened. The chief exports are hides, skins, eggs, opium, tobacco, and filbert nuts. Its silk industry is declining. T. was founded in 600 BC by Gk settlers from Sinope. In 1204 it was the cap. of Trebizond, an empire constituted by Alexis Comnenus. It became Turkish in 1462. In 1895 it was the scene of the Armenian atrocities. It was captured by the Russians in 1916, but in 1918 was retaken by the Turks. Pop. 33,969.

Tracery, in architecture, occurs only in the Gothic period. In England it began, towards the end of the 13th cent., with the grouping of 2 or 3 'lancet' (pointed) windows, enclosed by a dripstone (q.v.) also in the form of a pointed arch, the vacant space above the lancets and beneath the apex of the dripstone being often pierced with a small circular window. This is known as 'plate tracery' (A in illustration). The next step was to reduce the masonry between the various openings to narrow vertical moulded bars of stone ('mullions') and to continue these moulded bars around the tops of the lancets and around the circular window, thus forming 'geometrical tracery' (B), so called because it consisted of regular geometrical forms. In the third stage (C) the masons introduced flowing designs instead of regular geometrical shapes. With the increasing taste for stained glass, the painters began to demand a more convenient shape of window for their pictures; so the flowing designs gave place to nearly rectilinear 'lights'; and, as the size of windows increased, both in width and height, horizontal 'transoms' were introduced to strengthen the mullions (D). This 'rectilinear' or 'perpendicular' tracery, peculiar to England, prevailed until the end of the Gothic style in the middle of the 16th cent.

Trachea, or Windpipe, air tube which leads from the larynx to the bronchi. It is about $4\frac{1}{2}$ in. long, and is made up of fibro-elastic membrane enclosing cartilaginous rings about $\frac{1}{2}$ in. in diameter. The interior is lined with submucous tissue and ciliated epithelium. The T. begins at the larynx and proceeds downwards in front of the oesophagus until it bifurcates into the 2 bronchi (q.v.).

Tracheotomy consists of cutting into the windpipe below the cricoid cartilage (the 'Adam's apple'). A curved tube is

inserted into the orifice, and by this means breathing is carried on. The operation is called for when the upper respiratory passages are obstructed. At one time, when laryngeal diphtheria (q.v.) was a common disease, T. was frequently performed to relieve the asphyxia caused by the diphtheritic membrane blocking the laryngeal opening.



DEVELOPMENT OF ENGLISH TRACERY

A, Plate Tracery; B, Geometrical Tracery; C, Curvilinear or Flowing Tracery; D, Perpendicular or Rectilinear Tracery, with Transom.

Trachoma, form of conjunctivitis (q.v.) due to a virus which is conveyed in the bodies of lice. It is a highly contagious disease and pursues a chronic course, giving rise to corneal ulcers and scarring. It is prevalent in Egypt, Palestine, Africa, and India, and is a common cause of blindness in these countries. Children particularly are susceptible. T. is almost unknown in this country now, thanks to better living standards. Little advance has been made in the treatment of this disease, and the antibiotics and sulphon-

amides are helpful only in the accompanying secondary infection. The World Health Organisation has an expert committee on T.

Trachonitis, dist. of anct Syria, corresponding to the modern Lajla. It lies S. of Damascus, E. of Auranais, and N. of Batanea, in Bashan. In AD 37 Herod Agrippa, King of Judaea, received the tetrachy of Batanea and T. from Caligula.

Trachurus, see HORSE-MACKREL.

Trachyte, the geological name of a volcanic rock composed essentially of alkali felspar and a ferromagnesian mineral. The coarse-grained intrusive rock of the same composition is syenite (q.v.). T's occur in sev. volcanic dists., notably in S. Italy, the Auvergne, and in E. Africa. T's containing the feldspathoid nepheline are termed phonolites, and those containing leucite, leucitophyres. The T's and syenites are the commonest alkaline igneous rocks.

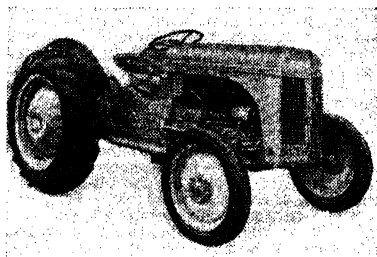
Track and Field Sports, term applied in the U.S.A. to athletic contests, including flat and hurdle racing on cinder track and field events—long and high jumps, pole vault, throwing the discus, throwing the hammer, putting the weight, and throwing the javelin. The Inter-collegiate Association of Amateur Athletics, to which most Amer. colleges belong, arranges contests annually. Apart from the colleges, the largest body is the Amer. Amateur Athletic Union, but there are many other smaller ones. It is largely due to the keenness engendered by those organisations that Amer. athletes hold their present place in the world's records and in the Olympic Games. See **ATHLETICS**.

Trackways, term applied generally to prehistoric routes and particularly to pre-Rom. ways in England. Their prin. purpose was the conveyance of goods, and they ran roughly in a straight line, being sited by such natural objects as stones, tumps, and ponds. It is probable that some of the Rom. roads (e.g. Watling Street) followed at least in part these T.

Tractarianism, see OXFORD MOVEMENT.

Tractor, name given to a compact mobile power-unit, used primarily for agric. purposes and generally deriving its energy from a petrol, fuel-oil, or vaporising-oil engine, though steam-engined tractors have been used extensively in the past, and are occasionally used to-day for heavier haulage and stationary belt-work. Certain countries, including Russia, are re-experimenting with the use of electricity as the motive power. In the early 1880s Brit. engineers had designed and built heavy steam traction-engines for farming work, but it was the Americans who first conceived the then novel idea of powering the farm tractor by means of the internal-combustion engine. In 1889, the Amer. Rurgor T. made its appearance in the Middle W. A massive and somewhat unwieldy machine of cumbersome proportions, its chassis was built to steam-engine specifications, yet it was powered by a single-cylinder Charter internal-combustion engine. Though exposing the limitations of its designers, the idea caught

on, and from then onwards the general use of steam T.s gradually diminished. The influence of the steam-type chassis, however, was such that it was not until 1899 that a specific friction-driven chassis with a hopper-cooled petrol engine was manufactured in America. This was possibly the first real attempt to break away from the heavy steam-engined type of chassis construction so favoured by the earlier engineers. The development of the many types of farming T.s appearing during the period 1899-1914 was largely in the hands of the Americans, though it is only fair to add that by now many reasonably reliable Brit. machines were being manufactured. Designers were now turning their attention to the problem of affording some sort of weather-protection both to the operator himself and the various vital parts of the power-unit; the Americans were the pioneers in a matter which had remained neglected for too long.



Harry Ferguson, Ltd., Coventry

TRACTOR

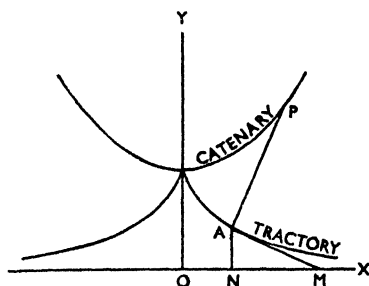
The tractor has a 4-cylinder wet-sleeve petrol engine with maximum belt horsepower of 23.9. There is a power take-off shaft for belt and pulley work at the rear, and a hydraulic system of depth control for regulating the working depth of any rear-mounted implement.

But it was the food crisis of 1918 which gave the real impetus to tractor design and production both in Britain and the U.S.A. The Brit. Gov. instructed its ministry of munitions to develop a utility T., and this, known as the 'M.O.M.', is generally reckoned as the forerunner of the lightweight internal-combustion-engined T. as we know it to-day. Since 1918 much progress has been made in T. design. Crawler types (track-layers) were developed to work under those heavy soil conditions in which a wheeled T. would be reduced to immobility. 'Wheelbarrow' T.s, suitable for the market gardener and horticulturist, have also been manufactured. Certain types of T.s have been manufactured with regard to the farmer's requirements in the matter of row-crop work with its many variations of widths and adjustments. The T. is now no longer a mere haulage machine; in the main it is a highly specialised item of

modern farming machinery. Another major development is the integration of the T. and implement as one co-ordinated unit, an idea originated and developed by an Ulsterman, Harry Ferguson. The principle of the system is that the implement is no longer towed by the T. but is an integral part of it, being mounted directly on to the rear of the machine and hydraulically controlled by the tractor driver himself from his seat. The obvious advantage of the system (now widely used all over the world) lies in the more positive and accurate control over the implement concerned plus greater traction and the consequent reduction in labour costs, since one operator only is needed.

With reference to the engines used to-day it may be said that whereas power-units were formerly of the heavy and slow-revolutionary type, the present trend is towards high-efficiency light-weight-to-power-ratio engines developing high brake h.p. and of sturdy endurance. Engines fuelled by vaporising-oil are enjoying great popularity in Britain and indeed throughout the world, while the fuel-oil compression-ignition type and the petrol engine are also used extensively. Each type has its respective merits. To-day it is difficult to foresee the ultimate trend in T. design. On the farm there is little that the T. cannot do, not only in cultivation and haulage but also—by belt and pulley—it is able to drive such necessary accessories as the circular saw and the threshing machine, etc. But power farming is an established fact, and the driving force is the agric. T. See also PLOUGHS AND PLOUGHING. See H. J. Hines, *Tractors on the Farm*, 1942; C. Culpin, *Farm Machinery*, 1952.

Tractory, or **Tractrix**, curve traced by a heavy particle dragged by an inelastic string attached to a point moving in a straight line. In the Fig. the heavy



particle is at the point A and the other end of the string, M, moves along OX. A then traces out a T. Taking OX and OY as co-ordinate axes, the equation of the curve is found by considering 2 expressions for the tangent of the angle AMN. We have $\tan(\text{AMN}) = -\frac{dy}{dx}$ and

$$\tan(\text{AMN}) = \frac{y}{\sqrt{a^2 - y^2}}, \text{ where } \text{AM} = a.$$

Therefore, $-dx = \frac{\sqrt{a^2 - y^2}}{y} dy$. On integration the equation of the curve is obtained, which is best expressed in the parametric form $x = a(\cos \phi + \log \tan \frac{1}{2}\phi)$ and $y = a \sin \phi$.

The centre of curvature at the point A is P. As A moves along the T. the locus of P is a catenary (q.v.), i.e. the evolute of the T. is a catenary.

Tracy, Spencer (1900–), Amer. actor, b. Milwaukee. He began his stage career in stock company, making his New York debut in 1922 in *R.U.R.*; he later appeared in sev. other New York productions. He made his screen debut in 1930 in *Up The River*, and his films include *Stanley and Livingstone*, *Edison the Man*, *Northwest Passage*, *Dr Jekyll and Mr Hyde*, *A Guy Named Joe*, *Edward My Son*, *Father of the Bride*, *Father's Little Dividend*, *Broken Lance*, and *Bad Day at Black Rock*. He won the Academy Award for the best actor in 1937 (*Captains Courageous*) and 1938 (*Boys' Town*).

Trade, Board of, gov. dept of the U.K. formerly a committee of the Privy Council. Its present form dates from 1786, when a permanent committee was constituted by an Order in Council (still in force). The members of the Board included the Archbishop of Canterbury, the First Lords of the Treasury and of the Admiralty, the prin. secretaries of state, the holders of a number of other Crown offices, and sev. private persons; but by the end of the Napoleonic wars the president and vice-presidents were the only operative members. From 1786 until the middle of the 19th cent. the Board's functions were mainly to advise the gov. and other depts and to collect information about trade and industry. During the second half of the 19th cent. the Board was allotted administrative functions under Acts of Parliament with respect to railways, tramways, mercantile marine, harbours, and electricity. However, as a result of increased gov. activity during the First World War, new ministries were created to perform the Board's previous functions in respect of labour, railways, tramways, harbours, and electricity. During the Second World War its responsibilities for food, shipping, the gas industry, petroleum and the coal mines were also transferred to other depts. The Dept of Overseas Trade (q.v.) was absorbed by the Board after 1945. The President of the Board of Trade, now assisted by a Minister of State as well as a Parliamentary Secretary, is responsible to Parliament for the work of the Board in its widest sense. As part of its general responsibility in relation to industry and commerce the Board continues to advise the gov. and other depts on questions concerning the internal and external trade of the U.K., and it interprets gov. policy to industry and commerce. This general responsibility includes also a more specific concern with most of the country's industries individually (though food,

agriculture and fisheries, building, fuel and power, transport, and shipbuilding are the concern of other depts); the fostering of Brit. exports and of Brit. participation in trade exhibitions held abroad; the collection, evaluation, and pub. of a wide range of economic statistics; and pub. of the *Board of Trade Journal*. In addition, the Board has certain administrative powers and duties in relation to insurance, company law, bankruptcy, patents, trade marks and copyright, weights and measures, enemy property, and the location of industrial development.

Trade and Commerce, the exchange of commodities for money or other commodities. The word 'trade' is related to 'tread'—a reminder that the beginnings of trade were associated with travel and the trodden way. Throughout hist. wars have had a profound effect on trade. Early trading expeditions often combined trade and plunder, sea-traders mixing commerce and piracy. Land commerce followed the caravan routes of the anc. world, the Nile and the Euphrates being connected by the route leaving Egypt to pass along the coast of Palestine and by the mts of Lebanon before turning W. to the basin of the Euphrates and Tigris, cradle of Babylonian and still older civilisations. Between Lebanon and the sea was the narrow land of the Phœnicians, a sea-faring people whose ships traded Mediterranean and Black Sea products as well as the tin of Cornwall and the precious caravan freight of the E. Before the Phœnicians there was an active commerce across the E. Mediterranean between highly-civilised Cnossus (Crete) and Egypt. The Greeks, sailing from is. to is. in the Aegean, became great sailors in their turn, extending their colonies to Marseilles and beyond; rivalling and eventually surpassing their Phœnician tutors. The conquests of Alexander the Great, by bringing E. and W. into contact, gave an immense stimulus to commerce. Alexandria became a great city, a centre of manuf. and of trade with the Far E. through the Red Sea. The Greeks came into collision with the great Phœnician colony of Carthage, founded 800 bc, which dominated the Mediterranean and its commerce; but it was a new power, Rome, that destroyed it (146 bc). The Romans were not a commercial people; but their Empire, with its superb network of roads, its posts, and above all, its Pax Romana, provided a unique basis for settled trade.

The eventual fall of Rome (AD 476) thrust the provs. of the W. Empire back towards barbarism. Roads fell into disrepair. On the ruins of Rom. civilisation trade collapsed. Based on manor and vil. life became localised and primitive. Before trade revived in Europe the rise of Mohammed in the 7th cent. had carried commerce as well as the sword from Bagdad through N. Africa to Spain; making Damascus, Cairo, Kairouan, Fez, Granada, Cordova, Seville, and Toledo, prosperous centres of industry and commerce. European revival came after

AD 1000. Tns, new and old, were growing, and fairs and markets continued to grow in spite of handicaps—bad roads, too little money and too many mints, multiplicity of regulations, tolls, duties, prohibitions, etc. Within the tns trade came under the protection and restriction of the merchant and craft guilds (see TRADE UNIONS), and did not escape the regulation of the Church, which forbade usury and frowned on profit. As the tns developed and prospered they gained power which vied with that of lord and bishop. Tns with common interests formed leagues. The Rhenish League in the 13th cent. soon embraced over 90 cities (Cologne, Strasburg, Frankfurt, etc.), with hundreds of vessels on the Rhine. It destroyed castles and swept away tolls. The Swabian League (Augsburg, Nuremberg, Ratisbon, etc.) was based on the Danube and traded N. products with those of the E. through Venice and other cities. In N. Germany and the Baltic the powerful Hanseatic League (q.v.) grew rapidly from the 13th cent. with depots at Bruges, Bergen, Novgorod, and London (Steelyard). The League dominated the Baltic as did Venice the Adriatic; their ships meeting at Bruges exchanged the produce of N. and S. Venice and the League both had their part in the Crusades (1096-1272) which had a greater influence than the campaigns of Alexander in promoting commerce between E. and W. Venice was the gateway to trade with the Levant and the E.; along with Genoa and Florence she enjoyed immense wealth and power until, c. 1500, the discoveries of the Americas and the Cape route to India altered the pattern of world trade. The Mediterranean ports declined in importance and trade went to Antwerp, London, and other ports well-placed for ocean commerce with the new and old worlds. The discoveries of new lands were matched in the realm of ideas by the Renaissance and the Reformation, reinforced by the new art of printing. These influences, with the advance of commerce, the invention of gunpowder, and the standing army, which all favoured national power against tn and league, were ending feudalism and the Middle Ages. The Pope divided the non-Christian world between Spain and Portugal. The Sp. galleons, bringing the precious metals from the New World, helped both to stimulate European trade and to raise prices. Under the new Mercantilist policy pursued by the nation-states it was the general aim to secure an excess of exports over imports—a favourable balance of trade which would command gold or silver for currency or 'war chest' purposes. Portuguese ships monopolised trade with the E. Indies until they lost power and trade to the Dutch in the 17th cent. The same cent. saw the wane of the Sp. power following wars with the Dutch and the growing power of England. In the second half of the century the Eng. were fighting the Dutch for maritime and commercial supremacy and by 1713, the treaty of Utrecht, following Marlborough's

victories over the French, estab. the ascendancy of England, with France as her only rival. The treaty gave England the slave trade monopoly with the Sp. colonies. Colonial trade was conducted frankly in the interest of the mother country, and in the 18th cent. successes against the French in America and India further extended Brit. colonial power and trade. Nevertheless, increasing trade with the U.S.A. after their secession (1776-83) demonstrated the mutually advantageous character of the trade between Britain and her late colonies. Eng. commercial predominance had grown from small beginnings in the Middle Ages when her great export was raw wool. The Eng. Merchants of the Staple exported raw materials via (e.g.) Calais; but up to the time of the Tudors the export trade was mainly in the hands of foreigners. The Hanseatic League privileges were annulled by Elizabeth. By the 14th cent. less wool began to be exported in its raw state and more in the form of cloth. In 1660 wool export was forbidden. Huguenot refugees enriched England and other countries at the expense of France. Thanks to them the Eng. silk industry assumed importance in the early 18th cent. The woollen and silk industries were protected against the competition of Indian cotton goods, a protection serving to foster the cotton industry that became a pillar of Eng. commerce.

At the close of the Middle Ages the growth of national power favoured the rise of national commercial companies, recognised by Royal Charter; and formed, many of them, as their names indicate, to exploit the world as opened up by the voyages of discovery. Eng. companies included, besides the early Merchant Adventurers (1404 and 1505), the Muscovy Company (1553), the Eastland Company (1579), the Guinea Company (1588), the Levant Company (1592), the E. India Company (1600), the Hudson's Bay Company (1670), the Royal African Company (1672), and the S. Sea Company (1711) of 'Bubble' fame. Other famous companies were the Dutch E. India Company (1602) and the Dutch W. India Company (1621). The former broke the Portuguese power in the E.—and for 2 cents. earned an ann. average of 18 per cent; the latter, a corporation of privateers making armed attacks on the Sp. 'silver fleets', often earned from 25 to 100 per cent a year. Company trading was intended to secure regulation and control, but failure in this respect and changing conditions reduced their number, few surviving the 18th cent. One of the last Eng. companies to go was the E. India Company, whose activities in India extended to gov. as well as trade. New ideas were stirring in the later 18th cent. In England Adam Smith was advocating Free Trade; while the Industrial Revolution gathered momentum as invention followed invention. Machinery was being applied with increasing ingenuity to textile and other industries. Steam was harnessed to drive the machine and pump

the mine. Coal was smelting the iron and becoming the main source of industrial power. By the turn of the cent. steam and machinery were playing a great part in the country's industrial and commercial predominance. The railway and the steamer, with good roads and canals, had come to reinforce the Industrial Revolution before 1851-60; and from then on there was the trade fillip of the gold discoveries; and above all, Free Trade. Britain had an export surplus, but used it in no Mercantilist spirit, investing abroad some £4,000m. net by 1913—to her own and the world's great benefit. Free Trade made England the free entrepôt for world trade; brought cheap food to her people and cheap raw materials to keep her exports competitive. More than that, it brought a new spirit to mankind with hopes of universal peace. The Brit. lead made a great impression throughout the civilised world. Tariffs were lowered, and in 1860 there was a reciprocal reduction and abolition of tariffs with France. But in the end the great nations retained and reinforced their protective systems. The U.K. retained Free Trade up to the First World War, but, after the Great Slump and the Second World War, had abandoned *laissez faire* not only for protection but for a planned economy. Planned economies are a world feature—planning is on a world scale and the subject of European and world conference. In the shadow of two world wars and the threat of a third the achievement of general Free Trade seems remote. Increasing freedom in trade is, however, the great aim of the U.N. as of its most powerful member, the U.S.A., now outstandingly the world's greatest industrial and commercial nation. Predominant in manuf., the U.S.A. may be thought to have as little to fear from foreign competition as the U.K. a cent. earlier. The U.K. built her wealth on the exchange of manufactured goods for food and raw materials. The field for this essentially profitable trade is diminishing; but there will always be room for international trade on a large scale given a world of settled peace and freedom from unemployment—a world which dares to plan for maximum specialisation with rational hopes of maximum reward.

See CUSTOMS DUTIES; FREE TRADE; MERCANTILE SYSTEM; PROTECTION. See J. B. Condliffe, *The Reconstruction of World Trade*, 1941; W. Röpke, *International and Inter-regional Trade*, 1942; A. J. Brown, *Industrialisation and Trade*, 1943; E. Staley, *World Economic Development*, 1945; E. M. Patterson, *An Introduction to World Economics*, 1947; and J. B. Condliffe, *The Commerce of Nations*, 1951. See United Nations pubs. for latest statistics of world trade.

Trade Boards, statutory bodies estab. under the T. B. Acts of 1909 and 1918. They formed part of the negotiating machinery in the settlement of industrial disputes, especially wage claims, and arise out of the arbitration boards set up before 1909 to settle disputes where collective bargaining failed to produce agreement

between employers and workers. By the Act of 1909 T. B. were instituted in 4 trades (wholesale tailoring, box manuf., lace manuf., and chairmaking). The Board of Trade had power, however, to apply the Act to other trades. The chief object of the T. B. was to prevent sweating, especially in home and factory work (see SWEATING SYSTEM), since the workers in the industries in question were not sufficiently organised to protect themselves from exploitation.

The T. B. Act of 1918 extended the operation of T. B.s to any industry where wage rates were considered by the minister of labour to be low or where any other means of settling wage rates by collective bargaining were lacking. As a result of the Act, 37 new T. B. were set up, but after 1922 on account of trade depression there was little further extension of the system. Under the Wages Councils Act of 1945 the function of the T. B. were taken over by the Wages Councils (q.v.). A T. B. consisted of members representing employers and workers in equal numbers, together with a number of independent persons known as Appointed Members, one of whom acted as chairman. Members normally held office for 2 years. It was obligatory for a Trade Board to fix minimum rates for time work; it could also fix other minimum rates, such as general minimum piece rates, special minimum piece rates, guaranteed time rate, overtime rates, etc. The deliberations of a Trade Board upon a question of wages were regulated by the rate the trade itself could economically afford. Although limited in their functions, T. B. improved working conditions in many depressed trades. See also ARBITRATION; CONCILIATION IN INDUSTRY; INDUSTRIAL RELATIONS (BRITAIN); WAGES; WAGES COUNCILS.

Trade Corporation, see CORPORATION; LOCAL GOVERNMENT.

Trade Cycle, term for the fluctuation of prices, profits, and employment over a period of sev. years.

Trade Diseases, see OCCUPATIONAL DISEASES.

Trade Disputes Acts. These Acts seek to define: (1) what a trade dispute is in the legal sense; (2) the legal position of persons involved in the dispute; and (3) the degree of legal protection persons affected, especially by consequent intimidation or coercion, may claim. Strikes are not illegal *per se* at common law, but such Acts as the Conspiracy and Protection of Property Act, 1875, imposed penalties on combinations, whether of masters or workmen, which resulted in depriving the public of such essentials as gas and water. Various other statutes were passed up to 1875, when the legal position was consolidated under the Combination Act of that year. It was not, however, until the Trades Disputes Act of 1906 that complete statutory immunity from civil and criminal liability was provided with respect to strike action. Other Acts followed, designed to clear the position regarding breach of contract consequent upon 'sympathetic' strikes, and

in 1927, following the General Strike of 1926, new restrictions upon strike action, picketing, and sympathetic strikes were embodied in the Trades Disputes and Trades Unions Act (1927). The Act provided that any 'strike having any object other than, or in addition to, the furtherance of a trade dispute within the trade or industry in which the strikers are engaged is to be unlawful, if it is designed and calculated to coerce the gov., either directly or by inflicting hardship upon the community.' The Act also provided that a lock-out was illegal if it came under the same category. The Act further provided that picketing was to be deemed unlawful if the picket attended in such numbers or such manner as to intimidate any person. It will be seen that the Act possessed very wide powers, aimed at preventing a recurrence of a strike of similar magnitude to that of 1926. After the General Strike the Labour Party placed the removal of this Act from the Statute Book in the forefront of its programme; and got its opportunity when it was returned to office in 1945: the Act was repealed in 1946.

Trade Facilities Acts. The economic and industrial depression of 1921 involved producers in great difficulty in finding sufficient capital either for the extension of business or for new ventures. In order to assist those who were unable to borrow capital in the ordinary way, owing to the stringency of supplies of money, a Trade Facilities Act was passed in 1921 whereby the Treasury guaranteed such loans under certain conditions. In 1926 a further Act was passed raising the limit to £75m., the operation of the Act to expire in 1927. The acute shortage of capital available for schemes of development overseas brought about a Trade Facilities Act in 1924 by which loans were guaranteed up to three-quarters of their amount for the purpose of extending public-utility ventures and expansion. The Sudan, Western Australia, and Newfoundland were the prin. areas to benefit.

Trade Mark (and Trade Names). The law relating to the registration of T. M. is now the Trade Marks Act, 1938, which replaces and largely re-enacts the Trade Marks Act, 1905, the Trade Marks Act, 1919, and the Trade Marks (Amendment) Act of 1937. This last-mentioned Act introduced important amendments concerning the definition of a T. M. severance of the mark from the goodwill, and licensing of T. M.s. The Merchandise Marks Acts also deal with offences as to T. M.s and trade descriptions from a penal point of view. Part of the Patents and Designs Act, 1907, as amended in 1928, which, so far as it concerns T. M.s, substituted 6 for 4 months as the term within which priority may be asked for an application for registration based upon a prior application, remains in force.

Definition. The Act of 1937 defines a T. M. as 'a mark used or proposed to be used in relation to goods for the purpose of indicating, or so as to indicate, a connection in the course of trade between the goods and some person having the right

either as proprietor or as registered user to use the mark, whether with or without any indication of the identity of that person.' As in the Trade Marks Act of 1905, the later Act includes in the term 'mark' a device, brand, heading, label, ticket, name, signature, word, letter, numeral, or any combination of these. A T. M. thus denotes the *producer* of a thing, and not the *thing produced*, and in that respect differs from a 'trade name.' To be valid, the mark chosen need not have any meaning, but whatever it is it must be distinctive. 'Distinctive' is defined as meaning 'adapted in relation to the goods in respect of which a T. M. is registered or proposed to be registered, to distinguish goods with which the proprietor is or may be connected in the course of trade from goods, in the case of which no such connection subsists, either generally or, where the T. M. is registered subject to limitations, in relation to use within the extent of the registration.' The actual distinctiveness of any given T. M. does not depend on abstract consideration of the nature of the mark itself but on the extent to which it has actually become distinctive by its use.

Essential Particulars. No mark will be registered under Part A of the register (*see infra*), unless it contains at least one of the following 'essential particulars': (i) The name of a company, individual, or firm represented in a special or particular manner (called 'name marks'). A surname alone is not the name of an individual, and therefore does not come within the category of essential particulars. But, on the other hand, it may have acquired such notoriety in connection with the goods as to be deemed distinctive and registrable. (ii) The signature of the applicant for registration or some predecessor in his business. (iii) An invented word or words (called 'word marks'). Laudatory epithets are generally rejected; as also mere phonetic renderings or ordinary words even with a meaningless suffix.

As to the use of a word or words as the name or description of an article, section 15 of the 1938 Act provides that the registration is not to be deemed to have become invalid by any such use unless it is proved either: (a) that there is an estab. use of the word or words as the name or description of the article by a person carrying on a trade therein not being used by the proprietor or a registered owner; or (b) that the article was formerly manufactured under a patent (being a patent in force at or granted after 23 Dec. 1919), that a period of 2 years or more after the cesser of the patent has elapsed, and that the word or words is or are the only practicable name or description of the article. (iv) A word or words having no direct reference to the character or quality of the goods, and not being according to its ordinary signification a geographical name or surname. (v) Any other distinctive mark, but a name, signature, or word or words, other than such as fall within the descriptions in (i), (ii), (iii), and (iv) (*supra*), shall not be

registrable under the provisions of this paragraph (i.e. sect. 9 (e) of the Act of 1938) except upon evidence of its distinctiveness. But any special or distinctive word, letters, etc., used as a T. M. by the applicant or his business-predecessors prior to 13 Aug. 1875, which has continued in use without substantial alteration down to the date of the application for registration was registered under the Act of 1905 (i.e. irrespective of its failing to satisfy any of the 'essential particulars' above noted). A thin red line woven into the margin of tracing cloth was held to be a good mark, having been used as such for 50 years.

Trade Marks which are not Registrable.—Likely to Deceive. It is unlawful to register as a T. M. any matter the use of which would be likely to deceive or cause confusion or would be disentitled to protection in a court or would be contrary to law or morality or any scandalous design; nor can a T. M. be registered in respect of any goods or description of goods which is identical with a T. M. belonging to a different proprietor which is already on the register in respect of the same goods or which so nearly resembles such a T. M. as to be likely to deceive or cause confusion. But in the case of honest concurrent user or other special circumstances, the court may permit the registration of T. M.s which are identical, subject to such conditions as the court thinks fit to impose.

There are various particulars which are not permitted by the Acts and Rules to appear as or as a part of any registrable T. M. These are representations of the King or Queen or of any member of the Royal Family; words such as 'Patent' or 'Patented,' 'Registered,' 'Copyright,' etc. The following may not be used unless the proprietor of the mark containing such arms, etc., can show a right, if any, to such use: (a) representations of the Royal or of the Imperial armorial bearings; insignia or devices so nearly resembling them as to lead to mistake; (b) the Brit. Royal or Imperial Crown; (c) the Brit. Royal, Imperial, or National flags; (d) anchor devices of the Admiralty, the eagle device and the wings of the R.A.F.; (e) the words 'Royal' or 'Imperial'; (f) any such words (such as 'Empire,' 'Dominion,' or 'Crown'), letters, or devices used so as to lead persons to think that the applicant has Royal or Imperial patronage or authorisation.

Concurrent User. Where a mark is used by 3 or more independent parties the mark has usually been held to be common to the trade and will not be registered.

Certification Trade Mark. A mark adapted in relation to any goods to distinguish in the course of trade goods certified by any person in respect of origin, material, mode of manuf., goods not so certified, is registrable as a certification T. M. in Part A of the register in respect of those goods, in the name, as proprietors thereof, of that person. Such mark cannot be registered in the name of a person who carried on a trade in goods of the kind certified.

The Register, Part A and Part B. The Act of 1905 continued the system of registration then in use. It was found that the provisions of the Act of 1905 as regards what could be registered did not appear to admit of the registration of marks which had no actual distinctiveness at the moment but might reasonably become distinctive in the future. The somewhat cumbrous method was therefore adopted of setting up a separate register B for these marks. Under the Act of 1919 they were subjected to the disability that they could not be registered under Part B until they had been used at least 2 years in this country. By the T. M.s Act of 1938 this disability was removed. By section 10 of the 1938 Act, to be registrable in Part B, the mark must be 'capable of distinguishing' goods in the manner stated above (see 'Distinctive' under Definition); and in determining whether a T. M. is 'capable of distinguishing' the court may have regard to the extent to which: (a) the T. M. is inherently so capable, and (b) by reason of the use of the T. M. or any other circumstances the T. M. is in fact so capable. A mark may be registered by the same proprietor in both parts. The rules as to registration in the 'A' class are stricter than for 'B' marks, and confer higher rights; for registration under 'A,' if valid, gives exclusive rights to the mark; that under 'B' is merely *prima facie* evidence of such right, and proof that a rival mark is not such as to deceive is a good defence. T. M.s must be affixed in some way to the articles sold, and thus again differ from a 'trade name' (which must not be confused with a 'name mark').

Legal Remedies for Infringement. In case of infringement, the injured party may choose between damages or having an account taken of profits. Registration is a condition precedent to the right to sue. In regard to *trade names* the law merely recognises a person's right to prevent others from personating his business by using any such description as would lead customers to confuse his goods with those of a trade rival. Brit. law recognises that where a person has used a T. M. in connection with his goods, so that it has become generally recognised as distinguishing his goods from those of others, he acquires a common-law right in such a mark. This proposition may be extended to include the general 'get up' of goods. But a proposal or intention to use a mark can give no common-law rights.

Ownership of Trade Marks with Goodwill. The Act of 1938 permits the assignment of a T. M. with or without the goodwill and, if with goodwill, then for all or some only of the goods for which the mark is registered. It is also permissible for a registered user to license the use of the mark (consult sections 22 and 28 of the Act of 1938).

Registration with no Intention to Use the Mark. It was formerly held that where registration of a mark had been obtained by a person who had no intention of using it, such registration was invalid and was not made valid by subsequent assignment

to another person who intended to use or had used the mark. This disability has been to some extent removed by the Act of 1938 if either a body corporate is about to be constituted and the applicant intends to assign the mark to the corporation or if the application to register the mark is accompanied by an application for the registration of a person as registered user of the T. M. and the court is satisfied that such person will be registered as such immediately after the registration of the T. M.

Classification. For the purpose of registration of T. M.s in the U.K. goods are classified in the manner set out in rules made under the Act of 1938. The classification serves as a ready means for bringing together T. M.s relating to the same or similar trades. In the case of an application for registration in respect of all the goods mentioned in a class, or of a large variety of goods, the Registrar may refuse to accept the application unless he is satisfied that the specification is justified by the use of the mark which the applicant has made or intends to make if and when it is registered.

Special Legislation for Protection of Certain Marks and for Certain Compulsory Marks. Special legislation exists for the protection of the Red Cross mark or the words 'Red Cross' (Geneva Convention Act, 1911), the word 'Anzac' (q.v.) (The Anzac (Restriction on Trade Use of Word) Act, 1916), and the words 'Port' and 'Madeira' (Anglo-Portuguese Commercial Treaty Acts, 1914 and 1916). The use of a T. M. is voluntary, but in certain cases the manufacturer is compelled to stamp on goods a specified distinctive mark. Of such goods, gold and silver plate has, from the 15th cent., been the most familiar example, and the most recent are imported watch cases, under an Act of 1907. Others are anchors and chain cables; butter, cheeses, and margarine (under the Food and Drugs (Adulteration) Act, 1928); gun barrels (under an Act of 1868); and gunpowder (under an Act of 1875). Buyers and sellers in good faith of marked goods are protected by various provisions in the Merchandise Acts, 1887-1953. (See also MERCHANDISE MARKS.) There are special provisions relating to false marking of particular goods, such as linen, cutlery, dyed goods, and metal buttons.

Registration of Business Names. The Registration of Business Names Act, 1916, and the Business Names Rules, 1917 and 1926 (made under the Act), provide for the registration of firms and individuals who carry on trade under a name other than their true name. Associations incorporated by Royal Charter now receive protection for their names and uniforms by the provisions of the Chartered Associations (Protection of Names and Uniforms) Act, 1926. Such associations as Boy Scouts, Girl Guides, and the Order of St John of Jerusalem also receive the benefit of this Act by Order in Council. See R. Haddan, *A Compendium of Trade Mark Law and Practice*, 1931-1942; J. and J. E. S. Ricardo, *Handbook on Trade*

Marks and Trade Names (2nd ed.), 1939; A. H. Cousins and H. E. Wadsworth, *Trade Names*, 1946; T. A. B. White, *Trade Marks and the Law of Unfair Competition*, (2nd ed.), 1951; Sir D. M. Kerly, *Law of Trade Marks and Trade Names* (7th ed.), 1951.

Trade Organisation, see CHAMBERS OF COMMERCE; COMMERCIAL INTELLIGENCE DEPARTMENT; OVERSEAS TRADE, DEPARTMENT OF; COMMERCIAL TRAVELLER; TRADE, BOARD OF; also EXHIBITIONS.

Trade Union, organisation of work-people formed primarily for the purpose of collective bargaining about wages and working conditions. A number of them offer friendly benefits, and some are affiliated to political parties. Though there were elements of T. U. organisation in Great Britain during the 18th cent., their emergence as an industrial force comes with the development of the modern factory system. T. U.s exist in agric. and commerce as well as in industry, and they are now found in most countries in the world, though an important difference in function exists between those in the democratic countries and those in Communist countries. Over a wide area, including Britain, the U.S.A., Canada, Australia, Germany, and in parts of Asia such as India and Pakistan, T. U.s are independent bodies with the prime purpose of negotiating improvements in pay and conditions with the appropriate employers or employers' federations. In these countries the unions generally enjoy the unfettered right to strike. In Russia and the Communist countries, however, T. U.s are controlled by the State and form part of its machine for increasing output and imposing labour discipline. Workers have no right to strike and little control over the policy of their organisations.

After the Second World War free trade unionism had to be rebuilt in Germany, and there is now a powerful democratic movement in the W. Zone. In some W. European countries T. U. forces are divided by political and by religious differences. In France, for example, there are the *Confédération Générale du Travail*, which is mainly Communist in sympathy, the *Force Ouvrière* which is largely democratic socialist, and the *Confédération Française des Travailleurs Chrétiens*. An important T. U. development in the U.S.A. came in 1955 when the American Federation of Labour and the Congress of Industrial Organisations merged to form the A.F.L.-C.I.O. as a unified national centre.

TRADE UNIONISM IN GREAT BRITAIN. The movement achieved its legal emancipation in Great Britain before elsewhere, since here modern industrialism first developed on a large scale. By the end of the 18th cent. there were more than 40 Acts of Parliament to prevent work-people combining in particular trades. General Acts prohibiting combination were passed in 1799 and 1800, when the Brit. governing class was in fear of popular movements following on the Fr. Revolution of 1789 (incidentally, the revolution-

ary gov. in France also prohibited T. U.s, under the *Loi Chapelier* of 1791, and T. U.s only received legal recognition in France in any full sense in 1884). The Eng. Combination Acts were repealed in 1824, after an agitation engineered by Francis Place and the Radicals, but stringent restrictions on T. U. activity were reimposed in 1825, and the T. U.s only secured adequate legal recognition in 1871-5. Prohibitions and restrictions were, however, unsuccessful in preventing working-class combinations, though they sometimes drove them underground, and many leaders were imprisoned for taking part in the work of organisation or attempting to apply collective bargaining.

During the 18th cent. trade unionism was for the most part confined to skilled craft-workers, organised in small local Trade Clubs, which only linked up occasionally over a wider area. These clubs were sometimes powerful, as they had a monopoly of skilled labour. Their main functions were to negotiate with employers (mostly small employers) about wages and hrs. to enforce limitation of apprenticeship, and to act as friendly societies. Until 1813 the magistrates still had power under the Elizabethan Statute of Artificers to regulate wages, and until 1814 to regulate apprenticeship, and often the object of the T. U.s was the enforcement of the Elizabethan statute. These provisions were repealed in 1813 and 1814 under the influence of the new doctrine of *laissez-faire*. From 1799 to 1824 trade unionism was forbidden under the Combination Acts. It continued to exist, and in some trades to negotiate with the employers openly and without prosecution. But T. U.s in the mining and textile trades were subject to severe repression, and unable to maintain a continuous existence, though new societies constantly sprang up in place of those which were dissolved. The repeal of the Combination Acts in 1824 was followed by a great wave of T. U. activity, culminating in the formation of the Grand National Consolidated Trades Union, under Robert Owen's influence, in 1833. But this body was destroyed in the following year after a series of strikes and lock-outs, and after the famous 'Dorchester Labourers,' who had formed an agric. branch, had been transported for the offence of administering unlawful oaths (see TOLPUDDLE MARTYRS).

After 1834 the work of organisation began anew on less ambitious lines. General unionism went out of fashion (though there was a revival of it in 1845-8), and attention was concentrated on building up stable unions in particular trades. The National Miners' Association (1841) came to grief, but from 1850 onwards powerful societies grew up, such as the Amalgamated Society of Engineers (1851), relying on high contributions and a mingling of industrial and friendly benefits to ensure stability of membership. This method was effective in organising skilled workers, but left unorganised the lower-paid workers, who could not afford the high contributions. Under the moderate

leadership of the new Amalgamated Societies of skilled workers the T. U.s at length secured more definite legal recognition under the T. U. Act of 1871. This was at first combined with repressive measures against coercion and intimidation under the Criminal Law Amendment Act of 1871, but the T. U.s strengthened by the Reform Act of 1867, which gave the urban workers the vote, got this Act replaced by the milder Conspiracy and Protection of Property Act of 1875. During the prosperous years between 1869 and 1874 trade unionism spread to the less skilled workers and, under Joseph Arch's leadership, to the agric. labourers. But in the middle seventies a slump in trade largely destroyed the unions' power. They were reduced to quiescence until the revival of 1888-9. The Miners' Federation was formed in 1888; and in the following year the London Dockers' strike was the beginning of a big movement of agitation among the less-skilled workers. This period marks a time of Socialist influence in the T. U.s, for the 'New Unionism' was led by men who had close affinities with the various groups of socialists now forming. It was the beginning of the 'General' Unions, enrolling unskilled workers, which in power, and influence challenged the earlier 'Craft' Unions.

Under Socialist inspiration, the Unions not only began to supplement collective bargaining with demands for industrial legislation (already a familiar policy among the miners and textile workers), but also to consider taking political action as an independent working-class party. Under Keir Hardie's leadership, the Socialist Independent Labour party (1893) undertook a vigorous campaign with the object of bringing the T. U.s into politics. In 1900 some T. U.s joined with the Socialist groups to form the Trades Union Congress, which was persuaded to launch, in partnership with the Socialist bodies, the Labour Representation Committee, which in 1906 adopted the name 'Labour Party.' The progress of the L.R.C. was slow at first, but an important legal decision threatening the existence of trade unionism rallied the T. U. movement behind it. This was the Taff Vale decision (1901), by which it was laid down that T. U. funds could be made liable for damage caused by a trade dispute. The agitation against this decision led to the winning of a large number of seats by the Labour party in the General Election of 1906, and to the passing of the Trade Disputes Act (1906), which remedied the grievance. But immediately the T. U.s suffered a further setback in the courts, the Osborne Judgment (1909) declaring it unlawful for T. U.s to spend money on political action. Further agitation followed, until this grievance was in part remedied by the T. U. Act of 1913. In the meantime, the failure of wages to rise with increasing prices and national wealth had led, in 1911 and the following years, to a great movement of unrest and strikes (transport workers 1911 and 1912, miners 1912), and to the emergence of new social

theories such as Syndicalism and Guild Socialism, claiming a large share in the control of industry for the organised workers. This movement of unrest continued in being up to the outbreak of war in 1914.

The War greatly increased the membership and power of the T. U.s owing to the high demand for labour and the necessity for constant negotiations as prices rose and industrial methods had to be modified in face of war conditions. The T. U.s emerged from the War with doubled membership, into a period of acute unrest. There were many big strikes between 1919 and 1921, when the coming of the great post-war depression seriously limited the power of the unions. But politically the strength of the Labour party continued to grow, and a minority Labour Gov. came into office for a brief period in 1924. The fall of this gov. was followed by a renewal of industrial strife, culminating in the miners' lock-out and the General Strike of 1926, when the Trades Union Congress organised a national strike movement in support of the miners' claim to a living wage. The defeat of the General Strike was followed by the Trade Disputes and T. U. Act of 1927, which not only declared general and sympathetic strikes to be illegal, but also withdrew many of the privileges gained by the T. U.s under previous Acts, and left the law ambiguous on many matters.

A second Labour Gov. held office, in a minority, from 1929 to 1931, when it fell as a result of the financial crisis arising out of the world slump. Meanwhile, in the industrial field, the T. U.s remained perforce on the defensive, owing to the general depression. Their membership had fallen heavily since the years of boom after the War; and their power was further menaced by the decline of the older industries, in which their strength mainly lay, and the rise of new mechanical trades operated more largely with unskilled labour. Numbers continued to decline until they fell below 4,500,000 by 1933. After that year economic conditions slowly improved, and by the outbreak of war in 1939 membership was back to the 6,000,000 mark, which had not been touched since 1921. One feature of this period was the increasing use of advisory councils and committees in the relations between various T. U.s. The structure of trade unionism and the question of closer unity engaged the attention of the General Council of the Trades Union Congress throughout the thirties. The ground was, therefore, well prepared in the thirties to make possible the important share which trade unionism had in the industrial effort of Great Britain during the Second World War. The Gov. consulted the T. U.s on all matters affecting their interests, and in industry generally joint committees did much to raise output and promote efficiency. One of the first acts of the Labour Gov. which came to power in 1945 was to repeal, in 1946, the Trade Disputes and T. U. Act of 1927. With the nationalisation of coal mining, electricity, and other industries, provision

was made for consultative councils consisting of representatives of the Boards of the nationalised industries and the staff concerned. Furthermore, much of the war-time national and local consultative machinery survived, somewhat adapted, to serve peace-time needs.

Organisation. A union is usually a national body with branches distributed over the whole country. Its branch officers are industrial workers, giving only their spare time to union duties, but it maintains a head office staff of full-time

National Union of Mineworkers and the National Union of Railwaymen. Third, there are the general unions, e.g. the 2 largest, the Transport and General Workers' Union and the National Union of General and Municipal Workers, which cater mainly for semi-skilled and unskilled workers in a wide range of employment, though they may also include skilled workers among their membership. A fourth group of unions is that for non-manual workers or occupational groups, among them being unions for teachers,

Group of Unions	Membership at end of 1955		
	Males	Females	Total
General labour organisations	1,814,290	320,350	2,134,640
Agriculture, forestry, and fishing	140,110	7,750	147,860
Coal mining	819,730	20,460	840,190
Other mining and quarrying	6,060	490	6,550
Treatment of non-metalliferous mining products other than coal	14,070	15,940	30,010
Chemicals and allied trades	13,710	6,390	20,100
Metal manufacture, engineering, shipbuilding, electrical goods, vehicles and other metal trades	1,759,040	95,500	1,854,540
Cotton	66,690	135,260	201,950
Other textiles and textile finishing	85,460	83,370	168,830
Leather, leather goods and fur	12,490	3,960	16,450
Clothing (except boots and shoes)	30,050	105,500	135,550
Boots, shoes, slippers, etc.	51,100	37,930	89,030
Food, drink, and tobacco manufacture	42,510	20,130	62,640
Manufactures of wood and cork	108,930	14,420	123,350
Paper and printing	249,350	79,550	328,900
Other manufacturing industries	10,260	3,220	13,480
Building and contracting	488,170	1,320	489,490
Gas, electricity, and water	37,390	4,770	42,160
Railways	508,710	29,010	537,720
Other transport and communication (excluding general labour unions)	399,620	56,720	456,340
Distributive trades	234,670	159,170	393,840
Insurance, banking and finance	83,000	24,740	107,740
National government service	239,170	124,960	364,130
Local government service	304,300	153,330	457,630
Education	149,440	202,020	351,460
Other professional and business services	90,080	114,230	204,310
Theatre, cinemas, sports, etc.	58,090	22,940	81,030
Other services	1,930	60	1,990
Totals	7,818,420	1,843,490	9,661,910

officials, who manage its affairs under the direction of a full or part-time executive committee and an ann., biennial, or triennial conference of delegates from the branches or districts. Types of T. U. fall into 4 main groups: first, the craft unions, the earliest form of trade unionism. Their membership is limited to skilled workers engaged in the same industrial employment or near allied employment. They are often small, although amalgamations have tended to produce some large multi-craft unions and some, such as the Amalgamated Engineering Union, which take on some of the characteristics of the second group, the industrial unions. The industrial unions are those which seek to include a given industry. Important examples of industrial unions are the

post-office workers, civil servants, municipal workers, and journalists. In almost every tn of importance there is a Trades Council, a federation of the local branches of the various T. U.s. See TRADES COUNCILS.

Almost all T. U.s, except those in the public services, provide benefits for their members in case of strikes or lock-outs. In many unions the expenses of management and negotiation, together with those of strike benefit, absorb nearly all the funds. Under Brit. law, payments for political purposes have to be made out of a separate fund, to which contribution is voluntary; and political payments account for only a very small part of total T. U. expenditure. In some T. U.s in other countries (e.g. France) contribu-

tions are much lower than in Great Britain, and friendly benefits hardly exist. In the U.S.A., on the other hand, contributions are substantially higher. As regards political organisation a number of T. U.s are affiliated to the Labour party. T. U.s are represented at the annual conference of the Labour party by their delegates. Local branches of T. U.s may also affiliate with local branches of the Labour party. Regional Councils of Labour have also been created by the Labour party to serve as links between the National Executive and local affiliated organisations, such as T. U.s, at district level.

Educational Activities. The provision of increased educational facilities for its members has been a recognised aim of trade unionism since the beginning of the movement. An important development is the Trades Union Congress training college, which forms part of the new Trades Union Council H.Q., and which will expand considerably the facilities in this field. See ADULT EDUCATION.

The number of T. U.s in the U.K. at the end of 1955 was 666, including 25 with H.Q. in N. Ireland, with a total membership of 9,662,000. These figures given by the Ministry of Labour include trade unionists in the forces and in overseas branches of unions with H.Q. in Britain. The Trades Union Congress does not include these in its total membership. The Ministry also counts separately some 180 unions which are shown as 12 federal bodies in the total of Trades Union Congress affiliations set out in the table below. The 6 biggest Brit. unions in order of size are the Transport and General Workers' Union, the Amalgamated Engineering Union, the National Union of General and Municipal Workers, the National Union of Mineworkers, the National Union of Railwaymen, and the Union of Shop, Distributive and Allied Workers (qq.v.). A number of unions register with the Chief Registrar of Friendly Societies under the T. U. Acts. There is no compulsion by law to do this, but many unions find registration an advantage. At the end of 1955 there were 405 registered unions with 8,500,000 members. The industrial distribution of union membership at the end of 1955, according to the Ministry of Labour, was as table on previous page.

See also TRADE BOARDS; TRADE DISPUTES ACTS; TRADE UNIONISM, INTERNATIONAL; TRADE UNIONISM IN THE U.S.A.; TRADES COUNCILS; TRADES UNION CONGRESSES.

There is now a large number of books about trade unionism and industrial relations. Among the most useful are: T.U.C. Annual Reports; S. and B. Webb, *History of Trade Unionism* (re-issued), 1950; monographs on National Trade Union Movements pub. by the International Confederation of Free Trade Unions; N. A. Citrine, *Trade Union Law*, 1950; G. D. H. Cole, *An Introduction to Trade Unionism*, 1953; *Industrial Relations Handbook* (H.M.S.O.), 1953; *British Trade Unionism, Five Studies* by P.E.P.,

1955; and special studies and histories of individual T. U.s.

Trade Unionism, International. In its international aspects the tendency within the trade union movement has been towards co-operation and fraternal association between national centres of trade unions and also between individual unions and federations of unions representing specific trades in various countries, e.g. the International Transport Workers' Federation and the Miners' International Federation. The International Working Men's Association ('The First International') was formed in 1864 and held its first meeting in London. It continued its annual congresses, leading a rather troubled existence, until 1872 when it lapsed, but was revived in 1889 ('The Second International'). It was later superseded by the International Federation of Trades Unions (I.F.T.U.), which existed for the interchange of information and ideas rather than for the formation of industrial policy applicable to its member countries. The I.F.T.U. declined during the First World War, but after the War its membership increased to over 18,000,000. More prominent were the activities of the International Labour Organisation (q.v.), set up under the League of Nations and now with the U.N.O. A further step towards international unity was a resolution passed by the Trades Union Congress at Southport in 1943, advocating a world conference of trade unions. The conference opened in London in 1945. As a result, the World Federation of Trade Unions (W.F.T.U.) came into existence and held its inaugural meeting in Paris in 1945. It represented over 66,000,000 workers in 56 countries, and within 2 years it comprised 71 organisations representing 70,000,000 workers. Its purpose was to promote unity of aim and action of the international trade union movement, and with this wider function it superseded the I.F.T.U., which was dissolved in 1945. Proposals were subsequently made to dissolve the international federations of separate trades and industries and transfer their functions to Trade Depts within the W.F.T.U. The W.F.T.U. suffered a setback in 1948 as the result of a split between the representatives of the unions from Communist countries and those which were non-Communist, and the Trades Union Congress, the Congress of Industrial Organisation (U.S.A.), and the Dutch Federation of Trade Unions withdrew their membership in 1949. The Amer. Federation of Labor, which shares with the C.I.O. the representation of labour in the U.S.A., had remained outside the W.F.T.U. from the beginning. A manifesto describing the World Federation as dominated by Communist organisations was issued by the free trade union organisations and their example was followed by the trade union federations or councils of, *inter alia*, Australia, New Zealand, Belgium, Switzerland, and Sweden. With the intention of forming a new international trade union organisation, the Trades Union Congress called a

conference in London at the end of 1949. At this conference the International Confederation of Free Trade Unions (I.C.F.T.U.) came into being, and within a year had the support of 50,000,000 trade unionists from most of the democratic countries of the world. At the beginning of 1957 the I.C.F.T.U. had a membership of more than 54,000,000 in 123 affiliated organisations in 88 countries.

Trade Unionism in Great Britain, see TRADE UNION.

Trade Unionism in the U.S.A. In the U.S.A. the beginnings of labour organisation date back to the days of Washington. Robert Owen carried his theories and practice to America when he set up a community at New Harmony in Indiana on the lines of the New Lanark experiment. By 1833 there were over a hundred trade unions in existence in Philadelphia, New York, Baltimore, and Boston. An attempt to form a national federation in 1834 was, however, short-lived. After the Civil War the growth of Amer. industrialism brought a parallel growth to the craft unions, which were, however, heavily handicapped by the opposition of employers and the constant dilution of labour by immigration. In 1866 the National Labor Union was formed, but lasted only 6 years, the difficulty being to unite local and national interests, immediate benefits, and wider ideals. A second organisation, the Noble Order of the Knights of Labor, fl. for a few years, especially among unskilled workers, but it roused the opposition of the craft unions. It was not until 1886 that Amer. labour was put on a firmer national basis with the creation of the Amer. Federation of Labor. This was largely due to the energy and vision of Samuel Gompers (1850-1924) (q.v.), a member of the Cigar-makers Union, who brought together the leaders of the larger national unions, including the iron and steel workers. The first major conflict was the nation-wide railway strike of 1877, ended by bringing Federal troops into action against the strikers. T. U. was considered to be broken, but it continued its struggle towards more powerful organisation. Legislation favourable to labour was introduced in a number of states, and in 1884 a Federal Bureau of Labor was set up, the forerunner of the present Dept. of Labor. Public opinion was against the severity with which a second railway strike was suppressed in 1886 also by armed force. T. U. slowly came to be recognised as an integral part of industrial life, and employers were more and more urged to settle disputes with the trade unions by arbitration. In 1900 the Amer. Federation of Labor had a membership of only a little over 500,000. By 1914 it was over 2,000,000. Women employees were also organised in a common effort towards obtaining better labour conditions, and the national Women's Trade Union League was formed in 1907. From the beginning of the First World War the wages and living conditions of Amer. workers began to improve considerably. The Amer. Federation

carried on a long campaign against unrestricted immigration, especially of classes likely to lower the standard of labour. By 1927 it secured legislation limiting immigration to an ann. quota or proportion of any nationality already represented in the U.S.A. In July 1935 labour's position was further advanced by the creation of the National Labor Relations Board under the Wagner Act. Its purpose was to conduct elections by secret ballot among union members on receiving a strike petition from the union concerned to remedy unfair labour practices on the part of an employer, and to prevent any discrimination against employees on account of union membership. The following year the Amer. Federation of Labor met with opposition, within the movement, to the form of craft unionism which it favoured. A move in favour of industrial unionism was led by John L. Lewis (q.v.), president of the United Mine Workers of America, who broke away from the Federation and formed a separate body called the Committee for Industrial Organisation (later, the Congress of Industrial Organisations). In the next few years he was successful in encouraging T. U. in the steel and motor industries in which craft unionism had failed to gain a hold. By 1940 the C.I.O. claimed a membership of 5,000,000 as against the 4,000,000 of the Amer. Federation. In that year an unsuccessful attempt sponsored by President Roosevelt was made to bring the 2 organisations together. In 1943 Lewis led the mine workers into a strike for higher wages, damaging though this was to the Amer. war effort. A Bill was hurriedly passed through Congress, making strikes illegal unless approved by a majority by secret ballot, and refusing to allow trade unions to contribute to political funds. In 1946, the year of a second coal strike, the United Mine Workers were briefly reaffiliated to the Amer. Federation. At this time the Federation and the C.I.O. united in denouncing the Labor-Management Relations Act (1947) known as the Taft-Hartley Act, which replaced the Wagner Act of 1935, being passed over President Truman's veto. This law enjoined a 60-day notice of strike or lock-out, and gave the President power to impose a further 80 days' postponement. It made the closed-shop illegal and forbade trade unions to compel their members to obey union policy. Trade unions were also prevented from using their funds for political purposes. The Act also brought the Communist issue to a head. It stipulated that any union wishing to take advantage of the services of the National Labor Relations Board must first certify that none of its officials was Communist. Both the Amer. Federation and the Congress of Industrial Organisations subscribed to this, although deploring the compulsion, as they were opposed to Communism. John L. Lewis, however, objected on principle and withdrew from the Federation. The United Mine Workers therefore stood outside both the

Federation and the C.I.O. and became one of the largest of the independent unions. The Taft-Hartley Act was unsuccessful in stopping the growth of the power of the trade unions, especially as full employment was reaching a new total of 60,000,000 jobs. On 5 Dec. 1955 the 2 general organisations merged under the name A.F.L.-C.I.O. By 1955 the total membership of trade unions was reckoned to be 18,000,000. The Amer. Federation of Labor claimed a membership of 10,000,000, as against 5,200,000 claimed by the Congress of Industrial Organisations. By far the largest union within the Federation was the International Brotherhood of Teamsters, with a membership of over 1,200,000, followed by the International Association of Machinists with 864,095. The 2 largest unions in the C.I.O. were the United Steelworkers of America and the United Automobile Workers of America, each with a membership of 1,200,000. The independent trade unions accounted for about 1,750,000. Among them were the United Mine Workers of America, 600,000, and the railway unions, of which the largest was the Brotherhood of Railroad Trainmen, 204,397.

Trade Winds, currents of air on the earth's surface travelling between the high-pressure belt of the sub-tropics and the low pressure of the equatorial belt. Their discovery is generally attributed to Columbus on his first transatlantic voyage in 1492, although they may have been known before that. Allowing for the normal frictional difference between surface wind and gradient wind (*see further* WIND), the trades follow the normal circulation round the semi-permanent anticyclones over the oceans in about 30° N. or S. In the extreme E. of such an anticyclone in the N. hemisphere the winds are N. to NNE, and veer steadily to NE. in the S. and to E. or a little S. of E. in the extreme W., where they are, however, not quite so marked. The main area of the trades is in the E. and S. half of the anticyclone where the wind is clearly NE. with a strength of about 10-15 m.p.h. A similar effect is noticed in the S. hemisphere. In Mar. the positions are: NE. (Atlantic) 3°-26° N.; (Pacific) 5°-26° N.; SE. (Atlantic) 0°-25° S.; (Pacific) 3°-28° S. In Sept. NE. (Atlantic) 11°-35° N.; (Pacific) 10°-30° N.; SE. (Atlantic) 3°-25° S.; (Pacific) 7°-20° S. From Mar. to July each belt swings northwards; from Sept. to Jan. southwards. Their steadiness of strength and direction led to the name trade (trend). At their origin they are dry, fresh, gentle breezes, but they gradually become damp and stronger, cumulus cloud of characteristic nature forming. The regions are marked by little rainfall and greater salinity over the ocean. Land regions to the E. of the trades are very dry, tending to desert conditions, but to the W. (i.e. the E. coasts of the continents) they cause much rainfall. With hotter air over the subtropical continents than over the sea, high pressure tends to form over

land at high levels, and the upper winds therefore circulate round the continents, *counter-trades* or *anti-trades* as they are called, being at lower levels (3000-6000 ft) near the continents than well out to sea and farther W., but the height of the change-over is variable. The direction is usually SW. in the N. hemisphere and NW. in the S. hemisphere, but the term should not be applied to the prevailing winds of similar direction in temp. latitudes which usually exist up to all heights. *Reversed trades* occur particularly in the Indian Ocean during the summer, when they form the SW. monsoons. They succeed in 'dragging' the SE. trades across the equator, the doldrums thus not occurring.

Trades Councils, local organisations in the Brit. trade-union movement, consisting of representatives from the branches of the various trade unions in a tn or dist. The T. C. first came into existence probably before 1850, but did not emerge as a wider organisation until 10 years later. They were active in consolidating the labour movement, and in 1883 were instrumental in the formation of the Trades Union Congress (q.v.). In 1865, however, they were excluded from the Congress in order to avoid dual representation of the affiliated trade unions. In Scotland they continued to be affiliated to the Scottish Trades Union Congress. In spite of their disaffiliation in England, they played an important although undefined part in the movement, and where they existed they have been prominent in all local affairs whenever a united labour front was desirable. They gradually came to be recognised as the local agents of the Trades Union Congress, and are now the channel for conveying information and ideas between the Congress and local trade-union branches. Their official connection is through the T. C. Joint Consultative Committee consisting of 6 representatives of the Congress and 6 of the T. C. The Committee also appoints a fraternal delegate to attend the Ann. Congress. The function of the T. C. is therefore mainly administrative and they are excluded from political activity. They co-ordinate the activities of local branches but do not take part in formulating policy. They are linked nationally through a series of federations. *See also* TRADE UNIONS.

Trades Union Congress, a permanent association of Brit. trade unions, which has had a continuous existence since 1868 and which each year turns itself into an ann. assembly of delegates meeting together to discuss common problems. The executive body of Congress elected each year is a General Council of 35 members, first constituted in 1921 to replace the old Parliamentary Committee, which had been in existence since 1869. The prin. officer of the T.U.C. is the general secretary, who is elected by Congress and holds office as long as his work gives satisfaction.

Any union may apply for affiliation to the T.U.C., and on acceptance, after a full investigation of its bona fides, shares in

the rights to table motions for discussion at Congress and to appoint delegates on the basis of one for every 5000 members. Neither Congress nor the General Council can override the authority of the individual unions, but there is a strong moral obligation to accept their decisions, and in practice unions accept voluntarily the discipline and obligations of solidarity in an organised movement. Each affiliated union is placed in one of 18 trade groups, and seats on the General Council are allocated according to the size of the group. There is a nineteenth group to cover the women membership. The allocation is as follows:

Group	No. of Members
1. Mining and quarrying	3
2. Railways	3
3. Transport (other than railways)	3
4. Shipbuilding	1
5. Engineering, founding, and vehicle building	3
6. Iron and steel and minor metal trades	2
7. Building, woodworking, and furnishing	2
8. Printing and paper	1
9. Cotton	2
10. Textiles (other than cotton)	1
11. Clothing	1
12. Leather and boot and shoe	1
13. Glass, pottery, chemicals, food, drink, tobacco, brushmaking, and distribution	2
14. Agriculture	1
15. Public employees	1
16. Civil servants	2
17. Non-manual workers	1
18. General workers	3
19. Women workers	2

Nomination to fill these seats is by the unions in each group, but election is by the whole of Congress. The General Council appoints representatives to a

number of national joint advisory committees with employers and the gov., and it has become customary for consultation to take place on all major issues of industrial policy. The only formal relation between the T.U.C. and the Labour party is through the National Council of Labour, which, with the Co-operative Union as a third member, provides opportunity for consultation within the broad British Labour movement. In international matters the T.U.C. is affiliated to the International Confederation of Free Trade Unions, and it supports the work of the International Labour Organisation. Special attention has been given by the T.U.C. in the post-war period to helping the young trade unions in Brit. ters. overseas.

The T.U.C. had 1,000,000 members by 1874, and by the time of the First World War had doubled its strength. Ending that war with some 6,500,000 members, there was a decline to some 3,000,000 in 1934. Thereafter a steady rise brought the total affiliated membership to 8,250,000 at the 1956 Congress. The T.U.C. represents 8 out of 9 of all trade unionists in Britain. Owing to amalgamations during recent years, the total number of unions has declined, and at the 1956 Congress 1000 delegates represented 186 unions with 8,263,741 members. This figure can be broken down into their trade groups as shown in table below.

The Scottish T.U.C. is an organisation of Scottish trade unions, Scottish membership of Brit. trade unions, and trades councils in Scotland. It confines its activities largely to Scottish affairs, and most of its members are affiliated directly to the British T.U.C. In Ireland there are 2 trade union organisations, the Irish T.U.C., and the Congress of Irish Unions.

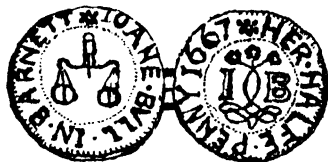
Tradescant Museum, see ASHMOLEAN.

Tradescantia, genus of plants of the family Commelinaceae, native of N. and tropical America and named after John Tradescant the elder. At least 30 species are cultivated in Brit. flower-gardens.

	No. of Unions	No. of Delegates	Membership in thousands
Mining and quarrying	4	143	719
Railways	3	49	529
Transport (other than railways)	10	96	1,394
Shipbuilding	5	19	125
Engineering, founding and vehicle building	28	117	1,443
Iron and steel and minor metal trades	17	46	205
Building, woodworking, and furnishing	19	74	589
Printing and paper	13	58	317
Cotton	6	35	159
Textiles (other than cotton)	22	32	104
Clothing	7	28	178
Leather and boot and shoe	5	20	108
Glass, pottery, food, chemicals, etc.	15	68	471
Agriculture	1	16	135
Public employees	4	25	250
Civil servants	8	62	464
Non-manual	15	50	260
General workers	4	62	812

T. virginica, the common spiderwort, is the one most usually grown in Britain, and bears purple blue flowers. Other species are *T. albiflora*, Wandering Jew, *T. fluminensis*, also Wandering Jew, and *T. blossfeldiana*.

Tradesmen's Tokens, or Trade Tokens. The official small change of England from Saxon times was of silver, which was coined in the Middle Ages to a value as low as a farthing. By the time of Elizabeth, however, the smallest piece was the halfpenny, weighing only 4 grains, which was inconvenient and easily lost. Some change was essential and a more useful size and weight desired. In the reign of James I, the king delegated his prerogative of striking copper money to Lord Harington, who was given a patent for striking farthings; similar patents were issued in the next reign, but were so grossly abused by the patentees, that, following a public outcry, the coins were suppressed by Parliament in 1644. On the death of Charles I (1649) the exclusive royal prerogative of coining copper and brass ended, and tokens immediately began to be issued by tins, tradesmen, and, occasionally, by private persons. During the whole of the Commonwealth period no copper coinage was officially issued, and tokens continued to be the small currency of the country. The tokens were usually struck in copper or brass, but lead was occasionally used. Their



A SEVENTEENTH-CENTURY TOKEN
FROM BARNET, HERTFORDSHIRE

Left, obverse; right, reverse.

denominations were farthing, halfpenny, and penny, though not many of the latter were minted. Generally speaking, they were round in shape, but square, heart and diamond shaped, and octagonal tokens were also made. The inscription on these tokens issued by tradesmen commonly consisted of the Christian and surname of the issuer, his trade and occupation, and the tn or vil. in which he resided. In addition, they had the value, the initials of the issuer, and a device. These designs were the arms of his trade guild, family arms, tavern- or shop-signs, and a device indicating the issuer's handicraft or trade. A regal copper coinage was started under Charles II in 1672, and a Royal Proclamation announcing the new currency forbade the use of all others (i.e. tokens). In the 18th cent. industrialists were much exercised over the problem of obtaining small change in which to pay their employees' wages, and Brit. industrial expansion during this

period occurred at a time when the Royal Mint took a very restricted view of its duty to the public, so that tokens reappeared in 1787-1801 and again in 1807-20, including latterly, silver and gold tokens. Legislation in 1817-23 finally stopped private minting.

Traducianism, theory that souls are propagated in a similar way to the procreation of the body. The doctrine originated in Tertullian's *De anima*. St Augustine seems to have inclined to this belief, without committing himself to it or, on the other hand, pronouncing for creationism (q.v.), the belief now obligatory for Rom. Catholics, the opinion that the soul was immediately created by God. The orthodox party were attacked as *Traducianists* by the Pelagians, in connection with the doctrine of the transmission of original sin.

Trafalgar, cape on the S. coast of Spain, and the scene of the great naval victory of the Eng. fleet under Lord Nelson over the combined Fr. and Sp. fleets under Villeneuve on 21 Oct. 1805. This battle shattered the power of France and Spain at sea at a time when Napoleon had made himself master of Europe and protector of the Confederation of the Rhine. In the winter of 1804 Nelson watched Toulon harbour, where the French were preparing to embark a large body of troops for some unknown destination. Nelson sailed for Barcelona to draw them out, and in his absence Villeneuve with 10 ships-of-the-line and many frigates put to sea (18 Jan. 1805). Nelson, believing Villeneuve to be going to Egypt, himself sailed for Sicily, but Villeneuve had passed the Straits of Gibraltar and effected a junction with the Sp. fleet at Cadiz. Nelson, on learning this, chased Villeneuve to the W. Indies, whence the French, in terror of his name, returned without accomplishing anything. Nelson returned in pursuit. Learning that the enemy had arrived at Cadiz, he returned to England, but immediately volunteered his services again, and joined Collingwood's squadron off Cadiz (29 Sept.). Early in Oct. Nelson received information from which he concluded the enemy would soon put to sea, and having on 4 Oct. laid before his adms. and capts. a simple plan of attack, he disposed his fleet in such a manner as to tempt the enemy to come out. The enemy put to sea on the 19th. The Brit. fleet consisted of 32 sail-of-the-line and 5 frigates. Perhaps the most remarkable phase of the battle itself was the desperate struggle between the *Victory* and *Téméraire* on the one side and the *Redoubtable* and the *Fougueux* on the other. It was a shot from the cross-trees of the *Redoubtable* that killed Nelson. The Brit. casualties were 450 killed and 1250 wounded. Nineteen of the enemy's fleet (which had comprised 33 sail-of-the-line and 7 frigates) were captured and 1 blown up. The prisoners numbered 12,000. The result of the victory saved England from all chance of an invasion and paved the way for the ultimate success of the Anglo-Russian treaty to resist the encroachments of France and to secure the

independence of Europe. See J. S. Corbett, *The Campaign of Trafalgar*, 1910; R. H. Mackenzie, *Trafalgar Roll*, 1913; A. F. Freemantle, *Trafalgar*, 1933.

Trafalgar Square, open space in London N. of Whitehall, laid out, partly on the site of an old royal mews, in 1829-45 (not fully completed until 1867) from the designs of Sir Charles Barry. It commemorates the battle of Trafalgar, and the central feature is the Nelson Column, 145 ft high, surmounted by his statue, with bas-reliefs of his battles at the base, and 4 large bronze lions (designed by Sir E. Landseer) beyond the angles. Below the N. wall of the square are kept the official imperial standards of length. T. S. is used for public meetings and demonstrations.

Traffic Regulations and Signs. These have a threefold object—the avoidance of congestion, the promotion of safety, and the guidance of road users. The Road Traffic Acts, 1930-56, enable highway authorities to regulate traffic by order. One-way traffic, restrictions on parking and on the type of vehicle which may use certain roads are among the measures used to ensure a smooth and safe flow of traffic. The Acts also enable highway authorities to erect traffic signs to convey warnings, requirements, restrictions, prohibitions, or information to road users, and to lay down carriageway markings. Warning signs are surmounted by a red equilateral triangle; mandatory signs are surmounted by a red ring; prohibitory signs are on or surmounted by a red disc; informative signs are rectangular without a surmounting symbol. Continuous white lines are used to indicate the centre of the carriageway at danger points, and broken white lines are used to isolate traffic lanes. They may be fitted with reflecting studs ('cats-eyes') to make them visible at night. Under the Road Traffic Acts of 1934 and 1956 speed in built-up areas is restricted to 30 m.p.h. as a safety measure indicated by a sign with black figures on a white ground within a red ring. Pedestrian crossings, either controlled by police or by light signals, or uncontrolled, are in use throughout Great Britain. Drivers of vehicles are obliged to give precedence to pedestrians on uncontrolled ('zebra') crossings (Pedestrian Crossing Regulations, 1954). Under the School Crossing Patrol Act, 1953, persons may be appointed with powers to halt traffic while children cross the road going to and from school. See also DRIVING LICENCES; HIGHWAY, *Road Traffic Acts*; MOTOR LAW.

Tragedy, see DRAMA.

Traherne, Thomas (c. 1638-1674), poet and mystical writer, b. Hereford, son of a shoemaker. Educ. at Brasenose College, Oxford, he took orders, and in 1657 obtained the living of Credenhill, near his bp.; 10 years later he became chaplain to Sir Orlando Bridgeman, Lord Keeper of the Great Seal, in whose household at Teddington he passed the remainder of his life. T.'s *Roman Forgeries*, 1673, and *Christian Ethics*, 1675, have only historical interest, but *Centuries of Meditation*, first printed in 1908, consists of short

reflections on religion in translucent prose of a wonderful musical quality, sometimes more poetical than his verse, which has occasional technical faults. His poems, discovered in MS. in 1896, were at first thought to be the work of Henry Vaughan (q.v.). Bertram Dobell (q.v.) identified them as Traherne's, and pub. them in 1903. Pure and limpid, with brilliant natural imagery, they have affinities with Blake and Wordsworth, and rank with the best of the 17th-cent. lyrical poets. The latest ed. of T.'s poems is by G. I. Wade, 1932, who also wrote his life in 1944; see also study by G. E. Willett, 1919.

Trail, city of Brit. Columbia, Canada, 48 m. SW. of Nelson on the R. Columbia. There is a large metallurgical plant, and near by a fertilizer factory. Pop. 11,319.

Trail, Henry Duff (1842-1900), poet and critic, b. London. Educ. at Merchant Taylors' and Oxford, he studied law but turned to writing, and from 1882 to 1897 was a leader-writer on the *Daily Telegraph*. His humorous verses, which show a rare gift of parody, were collected as *Recaptured Rhymes*, 1882, and *Saturday Songs*, 1890. He pub. studies of Sterne, 1882, and Coleridge, 1884, and wrote the standard life of Sir John Franklin, 1896. *The New Lucian*, 1884, is a series of 'dialogues of the dead.'

Trained Bands. Originally the élite of the General Levy of the Tudor period, provided by the larger towns and better trained because they could be assembled more regularly and for longer periods. Prov. T. B. appear all to have been modelled on those of London, who appear to have owed their efficiency to the leaven of the Honourable Artillery Company (q.v.). Only the London T. B. need seriously be considered here. In 1539 Henry VIII reviewed the City of London militia who were all dressed in white uniforms with the arms of the city worked on them before and behind (see UNIFORM).

In 1585 the first line of the London T. B., all musketeers, to the number of 4000, were exercised separately in Mile End Fields and reviewed at Greenwich. This body was trained by the H.A.C., which was in reality more a guild of archers and arquebusers than a fighting unit. James I in 1614 organised the London T. B. in companies, and in 1616 into 4 regiments, one each for N., W., S., and E., all under command of the Lord Mayor. This number was greatly expanded in the Civil war, and a Royalist spy's report roll of 1643 shows 9 regiments of T. B. and 5 of auxiliaries with an average strength of 1270 and 1000 respectively. Each regiment had about 70 officers, including sergeants and corporals, and a varying number of companies, each containing about 175 musketeers and 120 pikemen. It was these troops who raised the siege of Gloucester and won the battles of Newbury and Worcester, besides providing a strong Parl. garrison for the capital.

In 1661 Charles II abolished all T. B. except those of London. These con-

tinned to exist until 1794 when the 4 regiments of trained bands were reorganised as 2 regiments of militia. In renewing its charter William III specifically ordered that all commissioned officers of T. B must be members of the H.A.C., and this arrangement continued until 1779.

See MS. in Royal United Service Museum, London, 'The Ensigns of the Regiments of the 'Rebellious City of London . . . per opera Guilielmi Lovell, Armigeri, Sept. 26, 1643': C. Sebag-Montefiore, *The Volunteer Force*, 1909.

Training (Athletic), process of raising the level of mental and physical fitness as a means of preparation to take part in an athletic event. T. may be divided into 2 parts: (1) the attainment of general physical fitness, and (2) specific practice to perfect the technique required by the particular athletic event for which the T. is a preparation. The first is the sole object of T. in its early stages. Long walks, jog-trot, road or cross-country running, and attention to diet, are among the means employed. Gymnastic exercises may be included, and should be selected to develop the muscles required for the particular athletic event. If T. is overdone, staleness may result. The mental attitude is important. Perseverance, development of the powers of concentration and equally the ability to relax, and absence of worry are essential in successful T. After a fairly prolonged course of general T. the muscles become attuned, stamina is created, and specific T. for the event in question may then begin. Style and technique can only be perfected by regular practice. Since the Second World War interval, T. has become the most important factor in the development of middle-distance runners. This T. requires an athlete to run certain distances in set times with timed intervals. Almost every track and field athlete of international standard also now uses weight lifting in T. See Franz Stampfl, *On Running*, 1955. For a bibliography, see ATHLETICS; see also PHYSICAL TRAINING.

Training College, or Normal School, an institution in which intending teachers (being at least 18 years old) receive professional training and general education. The term N. S. is still widely used on the continent of Europe, but is no longer in use in the U.K. During the early part of the 19th cent. J. Lancaster and A. Bell (q.v.) independently initiated a scheme of teacher training called the monitorial system, in which pupils under instruction helped to teach those who were still younger. Largely as a result of the efforts of Kay Shuttleworth (q.v.) a T. C. was opened at Battersea in 1840. The subsequent development of teacher training up to the 1902 Act was largely through voluntary efforts. Most of the T. C.s were maintained and estab. by the various denominations with the help of gov. grants. By 1880, of the 43 T. C.s, 30 were Church of England, 2 Wesleyan, 3 Rom. Catholic, 2 undenominational, and 6 were undenominational and Brit. and

Foreign Bible Society. The majority of elementary school teachers, however, continued to be trained under the pupil-teacher system—an apprenticeship training whereby senior elementary school pupils remained at school, received further general education, and acquired the techniques of teaching under the guidance of estab. teachers. In 1890 training depts (known as Day Training Colleges) were set up and attached to the univs. After 1902 municipal authorities were empowered to build and maintain T. C.s, and the Day Training Colleges became Depts of Education within the univs. and undertook the training of graduates who were to teach in the secondary schools estab. by the 1902 Act.

Under the reorganisation proposed in the McNair Report (1944), the T. C.s and Depts of Education in England and Wales are administered in academic matters through the Area Training Organisations or Institutes of Education centred on the various univs. These Institutes award certificates to non-graduate T. C. students on the basis of which the Ministry of Education confers on them 'qualified' teacher status. A graduate of a recognised univ. is *ipso facto* a 'qualified' teacher. He may, however, undertake one further year of study at a univ. Dept of Education. If successful in the examinations he receives a Diploma of the Institute.

T. C. courses are normally of 2 years duration—they will be extended to 3 years in 1960. The period of training includes courses in 3 main fields: (1) theoretical studies in the principles of education, educational psychology, and health education; (2) instruction in methods of teaching children in certain age ranges, e.g. infant, junior, or secondary; and (3) further instruction in the student's special subject field. In addition, students spend a number of weeks in selected schools teaching under the guidance of their college tutors and the trained teachers already in the school.

T. C.s may be univ., Local Education Authority, or voluntarily maintained. Only one T. C. is for day-time students only, the rest are residential. There are special T. C.s for the training of physical education teachers; some T. C.s concentrate on handicrafts and housecraft. Art teachers might be trained in 1-year courses at approved Art Schools. There are 3 T. C.s for intending teachers of technical subjects. In 1957 there were 157 T. C.s in England and Wales and 22 univ. Depts of Educ. In Scotland the system is different, and there are 4 Training Centres for men and women, at Aberdeen, Edinburgh, Glasgow, and Dundee. There are also 3 T. C.s for women: 2 of these, at Glasgow and Edinburgh, are for Rom. Catholics, and the third at Dunfermline is for physical training. In N. Ireland there are 2 T. C.s.

In the U.S.A. most T. C.s and N. S.s are state supported. They have become Teachers Colleges with the power to grant first degrees, or State Univs. where post-graduate studies either to the M.A. or

Ph.D. levels are undertaken. The courses of study vary considerably. Unlike Eng. undergraduate courses, those in the U.S.A. can, and often do, include educational studies (in philosophy of education, psychology, history of education, sociology, and so on). Undergraduate courses combine professional studies with liberal arts instruction. Entry into T. C.s is on the basis of secondary-school graduation. Chairs of education have been established everywhere in the univs., and in the larger cities City Training Schools have been set up for the training of teachers.

Training Corps, Officers', see COMBINED CADET FORCE.

Trains (Named). Although quite early in railway history some of the more important trains bore names, these were almost always unofficial; such as the *Zulu* of the Great Western. Not until the present cent. did the practice of giving official names to important trains become well estab. The publicity value of named trains in these days of keen competition in transport is undoubted, and many countries follow the practice. Below is given a selection of such names, with, in parentheses, the towns served by the trains: *Flying Scotsman* (London-Edinburgh); *Royal Scot* (London-Glasgow); *Irish Mail* (London-Holyhead); *Cornish Riviera Express* (London-Plymouth-Penzance); *Golden Arrow* (London-Dover/Folkestone-Calais-Paris) (as *Flèche d'Or* in France); *Red Rose* (London-Liverpool); *Granite City* (Glasgow-Aberdeen); *Enterprise* (Dublin-Belfast); *Queen of Scots* (London-Leeds-Harrogate-Newcastle-Edinburgh-Glasgow); *Mistral* (Paris-Lyons-Marseilles-Nice); *Nord-Express* (Paris-Cologne-Hamburg-Copenhagen-Oslo-Stockholm); *Süd-Express* (Paris-Bordeaux-San Sebastian-Burgos-Madrid-Lisbon); *Rome Express* (Paris-Dijon-Turin-Genoa-Rome-Naples); *Simplon Orient Express* (Calais-Paris-Lausanne-Milan-Venice-Trieste-Zagreb-Belgrade-Salonika-Athens-Sofia-Istanbul); *Adria* (Copenhagen-Hanover-Munich-Venice-Zagreb-Split); *Rheingold* (Hook of Holland-Colonge-Mainz-Basel-Milan-Rome); *Lusitania Express* (Madrid-Lisbon); *Red Arrow* (Moscow-Leningrad); *Taurus Express* (Istanbul-Ankara-Alep-po-Baghdad); *Star of Egypt* (Cairo-Luxor-Aswan); *Blue Train* (Cape Town-Kimberley-Johannesburg-Pretoria); *Frontier Mail* (Bombay-Baroda-Delhi-Amritsar); *Spirit of Progress* (Melbourne-Albury); *Sunlander* (Brisbane-Cairns); *Canadian* (Montreal and Toronto-Winnipeg-Calgary-Vancouver); *Super Continental* (Montreal and Toronto-Winnipeg-Edmonton-Vancouver); *Twentieth Century Limited* (New York-Chicago); *Super Chief* (Chicago-Kansas City-Los Angeles); *Sunset Limited* (New Orleans-El Paso-Los Angeles); *California Zephyr* (Chicago-Denver-Salt Lake City-San Francisco); *Empire Builder* (Chicago-St Paul-Minneapolis-Spokane-Seattle); *Olympian Hiawatha* (Chicago-Seattle); *Estrella del Sur* (Mexico City-Puebla-Oaxaca); *Pan-americano* (Buenos Aires-Rosario-Santa Fe-Tucuman); *El Marplatense* (Buenos

Aires-Mar del Plata); *Tsubame* (Swallow) (Tokyo-Osaka).

Trajan (Marcus Ulpius Nerva Trajanus), Rom. emperor (AD 98-117), b. Italica near Seville, AD 53. After serving with distinction in the F. and in Germany, he was consul in 91. In 97 he was adopted by Nerva, whom he succeeded on the imperial throne in the following year. In 101 he set out upon his first Dacian campaign, and celebrated a triumph in 103, when he assumed the title *Dacicus*. The second campaign opened in 104 and was entirely successful: the Dacian monarch Decebalus committed suicide (106), his cap. Sarmizegethusa became the Rom. colony of *Ulpia Traiana*, and Dacia itself was made a Rom. province. The celebrations in honour of these victories lasted at Rome for 123 days. In 114 T. once again moved eastwards to deal with the Armenians and Parthians, spending the winter of that year at Antioch. Two campaigns (115-16) sufficed for the conquest of most of the Parthian empire. T. then descended the Tigris to the Erythraean Sea (Persian Gulf). He was obliged, however, to return, owing to a fresh revolt. On arrival at Ctesiphon he gave the Parthians a king. In 117 he fell ill, set out for Italy, but d. at Selinus in Cilicia. T. had married Pompeia Plotina, who persuaded him to adopt Hadrian (q.v.); he had no children of his own. One of the greatest men of antiquity, he was strong, hard-working, and of noble appearance. His public works included sev. important roads, a number of libraries, and a theatre in the Campus Martius at Rome. There too he built the Forum Traianum, at the centre of which stands a column, once the repository of his ashes. See B. W. Henderson, *Five Roman Emperors*, 1927.

Traiani, Portus, see CIVITAVECCHIA.

Trajectory, see BALLISTICS.

Trajectus Superior, see MAASTRICHT.

Tralee, chief tn of co. Kerry, Rep. of Ireland, the gateway to the Jingle peninsula. Its history is associated with the Desmond clan and the Dominicans who arrived in 1243. Principal churches are St John's, and the Dominican Church of the Holy Cross, which has stained glass by Michael Healy; Rathass Church, 1 m. E. of T., is a national monument. T. is now a progressive tn, with agric. and light industries; the Ashe Memorial Hall houses the Council offices, and there is a tn park of 75 ac. The world-famous song *The Rose of Tralee* was composed by William Mulhnick (1820-64). T. was a centre of the struggle for Irish independence. Pop. 11,400.

Trammel, see ELLIPTIC COMPASS.

Trammel-net, see FISHERIES.

Tramore, popular seaside resort of co. Waterford, Rep. of Ireland, 8 m. S. of Waterford. Town commissioners constituted Dec. 1948.

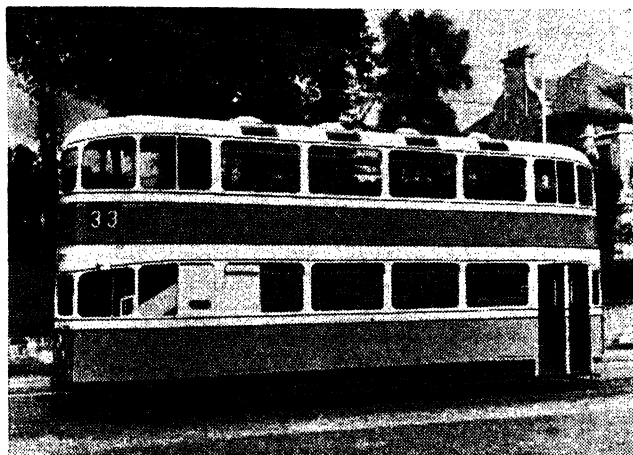
Trampoline Act, see ACROBAT.

Tramps, see VAGRANTS.

Tramways The word is used to denote 2 differing methods of railway transport—mineral lines and the street railway—and probably originated with the Scandinavian word *tram*, meaning a beam. The

early mineral T. developed from wooden beams laid in the road to facilitate the smooth passage of carts to a specialised way on which the vehicles were retained by flanged wheels, illustrated in Ger. 16th-cent. mining text-books; among early Eng. examples are pictures of Ralph Allen's Prior Park wagonway, serving stone quarries near Bath, in *A Course in Experimental Philosophy*, by Dr J. T. Desaguliers, 1734. Towards the end of the 18th cent., the platway with angle-iron rails to take ordinary carts or wagons with flangeless wheels, was evolved and Trevithick's steam locomotive of 1804 was intended to run on such a tramroad

purchase a system at a low price, and this clause retarded development and postponed electrification in many systems. Steam traction was introduced on some lines after authorisation of mechanical power by an Act of 1879. From the middle eighties cable systems were built in Birmingham, Edinburgh, and on Highgate Hill, London; Edinburgh's lasted until 1922. The trams on Blackpool front operated electrically from conductor rails in a conduit from 1884; in Lytham St Annes gas engines were employed. The Roundhay Park line, Leeds, inaugurated overhead electric traction in 1891. The London United Tramways



A. T. Kelly

Glasgow Corporation Transport

A GLASGOW TRAM: 1950

The tram has seating accommodation for 70 passengers: 30 in the lower and 40 in the upper saloon. The overall length is 34 ft 6 in.; the width 7 ft 3 in.; and the height from the rail, 15 ft 3 in.

at Pen-y-darren. The further progress of the steam railway from such lines was by use of the normal edge rail and flanged wheel.

The street tramway transferred the railway to public streets, and was introduced by the New York and Harlem undertaking in 1832. It was the invention of John Stephenson, a carriage builder, and soon captured business from the buses owing to the poor state of road surfaces on Manhattan Island at that time. Moreover, 2 horses could haul, say, 40 passengers on a tram, compared with 26 on a bus. Horse T. were introduced in Paris, 1853, and London, 1861; the projecting rails overturned carriages and the lines had to be removed; only after the grooved rail flush with the road surface had been introduced to take the flanged wheels did the street tram develop here. Two lines opened in London in 1870. Under the Tramways Act of that year after 21 years local authorities could

began electric traction in London in 1901; the London Co. Council's first electric tramway was opened in 1903 on the conduit system. Surface contact systems were operated in Hastings, Lincoln, Torquay, and Wolverhampton.

Besides authorisation under Parl. Bill procedure under the Tramways Act, 1870, T. were sanctioned under the Light Railways Act, 1896, a much cheaper process, because there was no definition in that Act of a light railway. There were at the peak in Great Britain 171 local-authority T. (some of which were worked by larger undertakings), and in 1918, 103 tramways companies. Of the 96 municipal transport undertakings in 1956 only Blackpool, Leeds, Liverpool, and Sheffield still operated T. in England and Aberdeen and Glasgow in Scotland, Dundee and Edinburgh having converted to motor buses during the year. There was also the short horse tramway, for

summer visitors, in Douglas, I.O.M. During 1956 the last company-owned tramway, Llandudno and Colwyn Bay, was abandoned. In addition tramway-type vehicles operate the Swansea and Mumbles Railway, on which the first passenger-carrying service in the world began in 1807, and the British Transport Commission's Grimsby and Immingham Light Railway.

The peak traffic on Brit. T. took place in 1919-20 with 4,800,000,000 passengers, with a revenue of £32m.; although some horse systems, such as Cambridge and Oxford, were never electrified and electric-tramway abandonment began at Sheerness in 1917, the all-time record mileage was 2624 in 1923-4. Large-scale abandonment in favour of trolley-buses (more than 30 systems, but few entire conversions; first systems at Leeds and Bradford in 1911 were feeder routes) or motor buses (usually diesel-engined after 1930) began from 1927 onwards.

The tramway is still a prin. factor in city transport in many European countries, notably the Netherlands, Belgium, Germany, and Switzerland; but considerable mileage has been given up in many countries in favour of the cheap and mobile motor bus, and long-term plans indicate considerable reductions in mileage even in countries such as Italy, where hydro-electric power is available. It has its best chance of survival where it can be placed on its own right of way—in tunnel, for example, under a city centre—thus becoming virtually a rapid transit railway. See ELECTRIC TRACTION.

See A. T. Dover, *Electric Traction*, 1917, 1929; J. H. Clapham, *Economic History of Modern Britain*, 1926; Charles E. Lee, *Evolution of Railways*, 1937, 1943.

Tranarossan Bay, see under ROSAPENNA.

Trance (Lat. *transire*, to cross over), is one of many popular names which have been used to describe hysterical stupor. In former times the condition was attributed to the passage of the soul out of the body of the subject and the invasion of another spirit for the time being. T. may occur spontaneously or may be induced by hypnosis. The spontaneous form may last for a week or even more, with intermissions, eventually passing into normal sleep, from which the patient can be roused in the ordinary way. In the hypnotically induced type, the duration and intensity are controlled by the hypnotist. The depth or intensity of a spontaneous T.-state can vary within wide limits. The degree of intensity may be sufficiently light to permit of the existence of some ideational activity, and the patient may exhibit some measure of discrimination in his reaction to stimuli. The more profound types may present the signs of catalepsy (q.v.), with a complete absence of response to all sensory stimuli, and 'flexibilitas cerea.' In T. loss of memory for the period varies in proportion to the intensity of the state. See also ECSTASY.

Tranent, burgh of E. Lothian, Scotland, 10 m. E. of Edinburgh, centre of an agric.

area. There are coal mines and quarries in the vicinity. Pop. 6600.

Trani (anc. Turenna), It. fishing port, in Apulia (q.v.), on the Adriatic, 25 m. NW. of Bari (q.v.). In the 11th cent. it had a code of maritime law, and during the Crusades (q.v.) it was a place of importance. With Barletta (q.v.) it forms an archbishop's see; the splendid cathedral dates from the 11th cent. The surrounding dist. is very fertile, and produces grain, olive oil, and wine. Pop. 35,000.

Tranquebar, tn of Madras State, India, on the SE. coast. T. is an old Dan. settlement (1616-1845), later acquired by the British. It is reputed to be the site of the first Protestant mission in India (1706) and contains a number of interesting old churches.

Transbaykalia, or Dauria, mountainous area in SE. Siberia, between Lake Baykal in the W. and Amur Oblast (q.v.) in the E., with forested ranges and steppe valleys, and rich in mineral resources. It was annexed to Russia in the 17th cent. See BURYAT-MONGOL AUTONOMOUS REPUBLIC; CHITA.

Trans-Canada Highway. In Dec. 1949 a programme of road-building designed to provide Canada with a national coast-to-coast highway was inaugurated. The general administration and co-ordination of the programme is the responsibility of the Federal Gov., but each participating prov. undertakes to construct and maintain that portion of the highway, other than on federal lands, within its borders. The Federal Gov. shares equally with the prov. govts. the cost of new construction and of existing highways incorporated into the system. By the spring of 1952, all the provinces except Quebec had signed agreements to this effect with the Federal Gov. Quebec, though not co-operating financially with the Federal Gov., has undertaken to provide a highway linking the W. end of the New Brunswick portion with the E. end of the Ontario portion. The total length of the highway, excluding the Quebec link, will be 4580 m. By Nov. 1955, 2853 m. had been paved, but only 1523 of them to T.-C. H. standards. There were 2 important gaps where construction had not begun, one of 50 m. in Newfoundland, and another of 180 m. in W. Ontario.

Transcarpathia, Oblast in W. Ukraine, adjacent to the Hungarian and Czechoslovak frontiers. It is situated on the S. slopes of the Carpathian Mts and the adjacent lowland in the SW. There are salt deposits. Grain and potatoes are grown, livestock is bred, and there are timber and food industries, salt and coal-mining. The prin. tns are Uzhgorod (cap.) and Mukachevo. From the 11th cent. it belonged to Hungary, 1919-39 to Czechoslovakia (as an autonomous unit), then again to Hungary, and from 1944 to the U.S.S.R. Czechoslovakia officially ceded T. to the U.S.S.R. in 1945. Area 5000 sq. m., pop. (1956) 929,000, mostly Ukrainians and Hungarians. See J. B. Heiser and J. E. Mellon, *Under the Carpathians*, 1946.

Transcaucasia, region bounded by the main Caucasian range in the N., the U.S.S.R. state frontier with Turkey and Persia in the S., and the Black and Caspian Seas in the W. and E. respectively. It includes the U.S.S.R. constituent reps. of Armenia, Azerbaijan, and Georgia (q.v.). Georgia joined Russia voluntarily, but the rest of T. was captured by Russia in the 19th cent. from Persia and Turkey, largely with the consent or even support of the local inhab. The period of Russian rule was one of rapid economic and cultural advance and the emergence of a native intelligentsia (q.v.) with autonomist views. After the seizure of power by the Bolsheviks (see OCTOBER REVOLUTION) in 1917 T. separated itself from Russia (see TRANS-CASPIAN FEDERATION), but was conquered by the Red Army with the help of local Communists in 1920. Within the U.S.S.R. T. is an important producer of oil, manganese ore, tea, citrus fruits, and wine. Transcaucasians, particularly Armenians and Georgians, have played an important part in Russian political life throughout the 19th and 20th cents.

Transcaucasian Federation, ephemeral state formed after the seizure of power by the Bolsheviks in Russia (see OCTOBER REVOLUTION) in 1917, and proclaimed an independent democratic rep. in April 1918. Its legislative assembly, composed of members from Transcaucasia of the All-Russian Constituent Assembly (see CONSTITUENT ASSEMBLY), was dominated by Georgian Mensheviks (see MENSHEVIKS), the Azerbaijani party Mussavat (q.v.), and the Armenian party Dashnaktsutyun (q.v.). Because of the difficult international situation—the Turkish invasion to take possession of ters. ceded to her by Soviet Russia in the Brest-Litovsk Treaty, and differences between the parties (owing to the mainly pro-Turkish attitude of the Mussavat)—the T. F. was dissolved in May 1918 into the reps. of Armenia, Azerbaijan, and Georgia (q.v.). After the conquest of these reps. by the Red Army, a Transcaucasian Socialist Federal Soviet Rep. was estab. in 1922, which became a constituent rep. of the Union of Soviet Socialist Republics (q.v.) in the same year. It was abolished in 1936 and the 3 reps. were directly subordinated to the gov. of the U.S.S.R. See F. Kazemzadeh, *The Struggle for Transcaucasia*, New York, 1951; R. Pipes, *The Formation of the Soviet Union*, Harvard, Mass., 1954.

Transcendental Number, a number which is not 'algebraic', i.e. cannot be the root of an algebraic equation. A T. N. can be expressed as an infinite series, and can be calculated to any degree of precision required.

See also EXPONENT; LOGARITHMS.

Transcendentalism has both a philosophical and a theological meaning. Philosophical T. is associated chiefly with Kant (whose use of the term differs, however, from that of previous philosophers), and his successors who defended the idea of *a priori* (or intuitive) as opposed to a *posteriori* (or experiential) cognition. In

a broader sense, T. signifies the spiritual or intuitive attitude of mind. Theological T. is allied to this latter significance, and expresses the idea of a supersensuous religious consciousness, an intuitive perception of divine truth, as opposed to dogmatic rationalism. The most prominent school of theological T. began in New England (the Transcendental Club, 1836), and included Emerson, Ridley, Bronson, Alcott, Thoreau, Margaret Fuller, and others.

Transcona, tn of Manitoba, Canada, 6 m. E. of Winnipeg. There is a creosoting works, and railway workshops. Pop. 8270.

Transcription, see ARRANGEMENT.

Transenna, a pierced marble slab or lattice in an Early Christian church.

Transept, in architecture, that part of a cruciform church which lies across, or in a direction at right angles to, the main axis.

Transfer of Shares. Shares in limited-liability companies are transferred by a deed called a transfer which must be signed, sealed, and delivered by transferor and transferee. The transferee must pay the appropriate stamp duty, the amount of which varies according to the amount paid for the shares. The transfer and share certificate are lodged with a registration fee (usually 2s. 6d.). The Articles of Association of some companies restrict the absolute right of transfer of shares. When the transfer has been registered a new share certificate is issued to the transferee, evidencing his title to the shares.

Transferred Epithet, see HYPALLAGE.

Transfiguration, Feast of the (6 Aug.), commemorates the vision of His glory given by Christ to the Apostles Peter, James, and John (Matt. xvii) after Peter's great confession. The feast was instituted in 1457 for the W. Church, but is sev. centuries older in the E.

Transformer, 2 inductively coupled windings usually wound on an iron core, though air-cored T.s. are used on high frequency. If one winding (the primary) is connected to an a.c. supply, the current produces an alternating magnetic flux in the core which induces an e.m.f. in the other winding (the secondary). The primary voltage is to the secondary as the number of turns in the primary to that in the secondary, assuming that the flux links equally with both windings. When the secondary is supplying current to a load, the secondary current is to the primary as the number of primary turns to the number of secondary turns. This is the transformation ratio, assuming no losses. The actual losses in a T. are partly copper losses due to resistance of the windings, partly core or iron losses due to eddy currents (q.v.) and hysteresis. The former are determined by a short-circuit test; the secondary is short-circuited and the primary is supplied at reduced voltage. The flux due to the secondary current is equal but opposed to that produced by the primary, the core loss is thus negligible, and the power supplied to the T. is expended in copper

osses. When the secondary is open and the primary supplied at normal voltage the current is negligible and the power supplied is expended in magnetisation and iron losses. If V_s = the secondary voltage on open-circuit when the primary is on full voltage and V_p = secondary voltage on full load, the percentage regulation is $100 (V_s - V_p)/V_p$. T. cores are built up of thin (0.014-in.) steel plates bolted together but insulated from one another by paper, varnish, or glass. They have usually 2 limbs, and the windings are coils or discs. Large T.s are immersed in oil in a steel tank, and the oil is cooled by air or water circulating in pipes, sometimes under pressure. Modern T.s are highly efficient, they have no revolving parts, and if properly installed they require little attention. See ALTERNATING CURRENT; ELECTRICITY.

Transfusion, passage of fluid from one vessel to another, especially the introduction of fluid into the blood-vessels. Saline solutions may be used for this purpose, but T. of blood alone provides the necessary ingredients when much blood has been lost. See further BLOOD TRANSFUSION.

Transgression, in geology, the invasion of land areas by the sea, as a result either of subsidence of the land or of a rise of sea-level. Minor T.s have taken place repeatedly in the course of geological hist., and the more recent of such minor T.s are attested by the occurrence of such phenomena as submerged forests and drowned valleys. Major T.s involve the submergence of enormous areas of land, and may result in a total change in the size and shape of the land areas. After a major T. marine sediments are laid down upon the surface of rocks which once formed part of the dry land, and such episodes are therefore marked in the geological record by unconformities (q.v.). The last great marine T. took place towards the end of the Cretaceous Period.

Transients, in electric circuits, machines, and transmission lines, are voltage and current phenomena occurring when a state of equilibrium is disturbed, until a new state of equilibrium is established. They may be due to internal causes—a change of load conditions, the switching-on or -off of a generator, a short-circuit, the action of a circuit-breaker; or external causes—atmospheric conditions, lightning, flash-over of insulators due to fog or moisture. T. often take the form of travelling waves on transmission lines or in transformer windings, which are reflected at points where the line characteristics change, as in connections of cables to overhead lines. In modern interconnected systems spanning many hundreds of miles, covering large areas, and involving vast amounts of energy, generated, consumed, and transmitted over the lines, T. face the engineer with some of the most important—and complicated—problems.

Transistor, a device similar in action to a thermionic valve, consisting of a single crystal of germanium with 3 electrodes, a base, a collector, and an emitter. A

voltage applied between base and collector gives rise to a weak current, a change of current between emitter and base produces amplification of the current through the collector. In one type, the germanium crystal, a small pellet is soldered to a cylindrical brass plug forming the base, the other 2 electrodes on a phosphor-bronze and a copper-beryllium wire placed close together in contact with the crystal. The T. depends for its action on the semi-conducting properties of germanium. It is a very small but robust instrument; its use as power rectifier is being developed, and it is already widely used in hearing-aids and telecommunication apparatus for medium frequencies. See SEMICONDUCTOR.

Transit Circle, see TRANSIT INSTRUMENT.

Transit Instrument, an instrument for determining the moment when a star, planet, etc., crosses the meridian, for the purpose (1) of ascertaining its place 'fundamentally' on the celestial sphere, or (2) of determining the local apparent sidereal time when the star's 'place' is known; from this apparent time the mean solar time follows if the long. is known, or the long. if the mean solar time on some standard meridian (e.g. Greenwich) is known. The instrument consists of a very rigid telescope with its optical axis closely perpendicular to a mechanical axis which terminates in a pair of heavy pivots, symmetrically placed on opposite sides of the telescope. These pivots lie in bearings as nearly as possible horizontal E.-W., so that the telescope can be directed only to points on the meridian. In the field of view is inserted a system of wires—the *reticle*—consisting of 5 or more vertical lines and 1 horizontal line. These wires are usually spider threads, and their distances apart are found very accurately by repeated observations. The time of transit of a heavenly body across the central vertical wire is determined by noting its time of passage across the other vertical wires and then taking the mean; this was formerly done by listening to a clock beating sec. and then estimating the instant to the tenth of a sec. when the body passed over each wire. This 'eye-and-ear' method was replaced by an electric tapper which the observer used the instant the star passed over a wire, and this sent an electric impulse which actuated a pen; this in turn traced a line on a revolving drum of paper on which the sec. of a standard clock were also automatically recorded. The paper recordings could be read at leisure, and this chronograph (q.v.) method was improved on early in the present cent. by the 'impersonal micrometer.' Instead of taking observations by the fixed wires, the observer slowly turns a wheel which moves a wire across the field of view so that the star is bisected by the wire all the time, and as the wire moves it passes over contacts which automatically record the instant very accurately on a chronograph. Continuous observation is unnecessary, because as the star takes about a min. to pass over the field of view the observer

need not concentrate on it, except about the time the star is nearing contact, and in fact when it is nearing this a warning pip on a loudspeaker warns him to concentrate on bisecting the star. A small electric motor is used to drive the wire across the field a little slower than the true speed, and at the end of the transit the wire is rapidly turned back.

Transit Circle (or meridian circle). A transit equipped to determine also the altitude (and hence the declination) of the star at transit. A large divided circle is attached to the transit and read by 4 or 6 fixed microscopes with micrometer eyepieces, and there is a second moving spider-thread, with its micrometer screw, in the focal plane of the telescope, at right angles to the first. The micrometer reading for bisection by this wire is usually taken before and after meridian passage. It has to be combined with the circle readings. The division-errors of the circle must be determined; this is also a laborious process, but in a good instrument they should never change.

Broken Transit. Some small reversible transits have the optic axis turned through a right angle, by reflection at a 45° mirror, so that the light comes out through one of the pivots, made hollow for the purpose; the eyepiece is then in a fixed position on the end of the pivot.

The method of transit-observation was started in principle before actual transit instruments had been invented; the first Greenwich transit was erected by Halley in 1721, and the first transit circle by Airy in 1850. This instrument still defines the Greenwich meridian (as adopted internationally in 1884), but is now a museum piece. Observations are now made at Hurstmonceux with a newer instrument (1955) and are corrected to the Greenwich meridian. For further information see *Astronomy for Everyman* (ed. Martin Davidson), chap. ix, 'Light and Instruments,' by E. G. Martin.

Transjordan, ter. roughly corresponding to the area of the medieval Seljuk kingdom of Kerak and of Oultrejordain in the Lat. kingdom of Jerusalem, is now (together with the Arab parts of Palestine, q.v.) an independent Arab kingdom, the 'Hashemite Kingdom of Jordan' (q.v.).

Physical Geography. The N. part of the ter. is elevated country, rising to about 4500 ft above sea-level, which, on its W. side, declines sharply to the narrow fertile plain of the Jordan valley and, on its E., slopes more gradually to grasslands traversed by the Hejaz railway and eventually becomes merged in the desert. This grassland strip forms the summer pastures of Bedouin tribes who in winter move E. for pasture. The wheat and barley lands of the Kerak and Balqa tribes, of the Circassian colonies, and of Arab villagers lie W. of the Hejaz railway. Generally speaking, the country to the E. of this railway is largely desert, but to the W. of this line it is potentially of high agric. value. The deep lateral valleys yield water for irrigation of valley lands and of considerable land areas of the Jordan depression which latter are cul-

tivated by semi-nomad tribes or used as winter grazing ground.

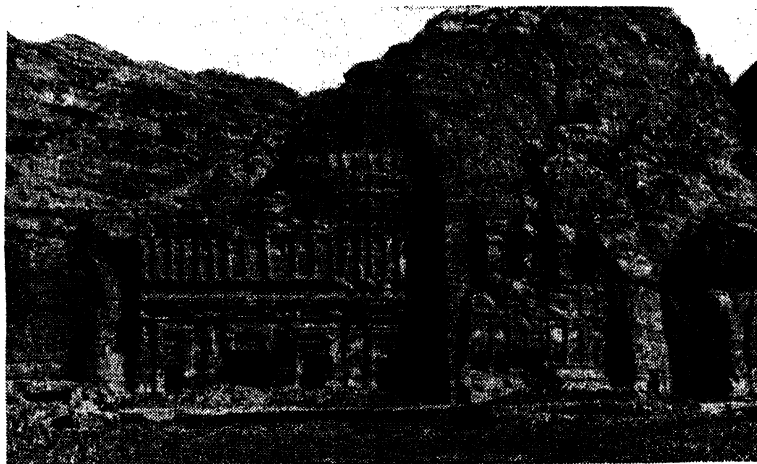
Cereals are grown, vines flourish, and some of the anct forests of Gilead survive; but of the whole area of T. only a very small part receives enough rain to render cultivation possible. T. consists of the 5 dists. of Maan, Amman, Kerak, Belqa, and Ajlun, and the Desert Area. There are many large vils. in the N., but the only tns of any size are Amman (the cap.), Salt, and Kerak. There are phosphate deposits; potash is found in the Dead Sea, and possibly there is oil in the S. area. The road running from Amman to Maan has been continued to Aqaba (Akabah), and from this main road, branches run to Madeba, Kerak, Rafleah, Petra, and other tns. A metalled road, fit for motor traffic, connects Amman with Jerusalem.

Population. There has been no official census in T., but in 1938 (the last year an official report was issued) the pop. was estimated at 300,000; of these 260,000 were Arab Muslims, 30,000 were Arab Christians, and 10,000 were Caucasian elements (chiefly Circassian) settled by the Turks over 60 years ago following the Turco-Russian war. There are also small minorities of Turcomans, Persian Baha'is, and Shishans. According to the organic law of 1928, Arabic is the official language (Art. 15), and Islam the State religion (Art. 10). The people of T. are divided into the following groups: (1) the inhab. of the tns; (2) the settled agric. pop. concentrated on the strip of tableland situated on the edge of the Jordan valley and of the Dead Sea, and measuring 200 m. from N. to S. and some 25 m. in average from W. to E.; (3) the semi-nomads living in tents but cultivating the soil; and (4) the Bedouin, or Nomads, who are dependent on their flocks; the nomadic tribes are subdivided (according to the Electoral Law of 1928) into 'the people of the N.' (the Beni Sukhr, Sirhan, Beni Khalid, Issa, and Sleit), and 'the people of the S.' (Howeitat, Mana'in, Hajaya, and others). There are constant seasonal migrations on the part of the Bedouin from T. into Palestine, and from Arabia into T., and back again. Land settlement is important, for the pop. is increasing with remarkable rapidity. Much *mashaa* (common) land has been divided, and a Dept of Development and Hydrographic Survey has been estab. The outlay on social services and public works has increased steadily.

The Formation of the Kingdom of Jordan. Under Turkish rule, T. was part of the vilayet of Damascus. After the First World War the Supreme Council of Allied Powers at San Remo, on 25 April 1920, allocated a mandate for Palestine (q.v.), including T., to Great Britain. This was later confirmed by the Council of the League of Nations on 24 July 1924. In April 1923 the Brit. Gov. recognised the existence of an independent gov. in T. under the rule of Amir (later King) Abdullah (q.v.), and on 20 Feb. 1928 an Agreement between His Britannic Majesty and the Emir (Amir)

of T. was signed in Jerusalem, and having been accepted by the Legislative Assembly (set up under Art. 11) was ratified on 31 Oct. 1929. In 1934 the Agreement was amended, and in 1938 the Organic Law was amended. On 16 May 1938 Great Britain agreed to the formation in T. of a Council of Ministers, responsible to the Emir, in place of the existing Executive Council. In Feb. 1946 the Emir visited the U.K., and a treaty of alliance for 25 years was signed on 22 Mar. 1946; the U.K. recognised T. as an independent state with the Emir Abdullah as sovereign. On 25 Apr. 1946 the Emir was proclaimed King of T. in a ceremony at Amman, and on 12 June 1946 the

technique and varied in form, painted designs being common. The walls of the houses were adorned with amazing fresco paintings, which reached a higher pitch of achievement than the art of Palestine, Syria, and Mesopotamia did for thousands of years thereafter. An important civilisation flourished between the 23rd and 20th cents. BC along the N.S. track through central T., but c. 1900 BC the formerly flourishing settlements and fortresses fell into disuse; presumably it was around this period that the catastrophic destruction of Sodom and Gomorrah (Gen. xix. 24-8) took place. Not until the beginning of the 13th cent. BC did a new agric. civilisation appear belonging to the



TRANSJORDAN: THE TOMB OF THE THREE STOREYS AT PETRA

E.N.A.

Foreign Office announced the appointment of an Envoy Extraordinary and Minister Plenipotentiary to T. On 15 Mar. 1948 a new Anglo-T. treaty of alliance was signed in Amman. In June 1949 the name of T. was changed to 'The Hashimite Kingdom of Jordan', and the annexed Arab Palestine forms an integral part of it, *see* JORDAN, KINGDOM of.

Prehistoric and Ancient History. T. is rich in anct. remains. There are prehistoric rock-drawings, including representations of the ox and the ibex, which probably come from the Middle Stone Age, and also menhirs and dolmens, which probably date from the Late Stone Age (up to c. 5000 BC). Extremely interesting is the Chalcolithic culture (5th and 4th millennia BC), known as the Ghassulian. It takes its name from the site of its first discovery, Telcilat el-Ghassul, just N. of the Dead Sea; it was excavated by the Jesuit fathers from 1929 to 1938. The pottery was much improved in

Edomites, Moabites, and Ammonites. From the 6th to the 2nd cent. BC, there was little or no settlement, and mainly nomadic occupation, but the 1st cent. BC and the 1st cent. AD witnessed the flourishing Nabataean culture (*see under* NABATAEI), which is exemplified in the abandoned cap. of Petra, one of the most remarkable cities of the anct. world. Also the Decapolis (q.v.) fl. in this period. It is mentioned on 3 occasions in the Gospels. Except Scythopolis (*see under* BEISAN), all of the tns of the Decapolis lay to the E. of the Jordan. Gadara is identified with the ruins of Umm Qeis, some 5 m. SE. of the Sea of Galilee. Gerasa (q.v.), known to-day as Jerash, lay on one of the tributaries of the Jabbok. Excavations conducted by Yale Univ., Brit. School of Archaeology in Jerusalem, and the Amer. Schools of Oriental Research, in 1925-31 and 1933-4, have revealed that in the early cents. AD Gerasa was one of the most brilliant cities of T. Pella (Fahl), midway between

Gadara and Gerasa, was the city to which the Christians fled from Jerusalem in AD 68 and again in AD 136. Philadelphia (it was formerly known as 'Amman,' having been the chief city of the Ammonites, and it is now called Amman, the cap. of T.), the Rabbat-Ammon of the O.T., was rebuilt by Ptolemy II Philadelphia and named for him: extensive Rom. ruins are still to be seen of this southernmost of the cities of the Decapolis. Christian Bishops of Pella are mentioned as late as the 5th and 6th cents. AD, and a number of early Christian churches (of the 4th to the early 7th cent.) have been investigated in Gerasa (which was shattered by earthquakes in the 8th cent., and left deserted for most of the next 1000 years), but generally speaking T. was already apart from the main streams in which the hist. of the future, till modern times, was to flow. A systematic archaeological survey of T. was carried out, in the years 1933-43 by the Amor. scholar Nelson Glueck, who also discovered (in 3 short campaigns, 1937-40) at Tell el-Kheleifeh (ancient Ezion Geber) on the Gulf of Akabah, remains of copper refineries going back to the 10th cent. BC and the reign of King Solomon.

See F. G. Peake, *A History of Transjordan and its Tribes*, 1934; A. Konikoff, *Transjordan: an Economic Survey*, 1946; J. B. Glubb, *The Story of the Arab Legion*, 1948; King Abdullah, *Memoirs*, 1950. See also bibliography under PALESTINE.

Transkei, native reserve in the Cape Prov. of S. Africa, 16,554 sq. m. of some of the most fertile and beautiful country in S. Africa. The home of 4 tribes, Fingoland, Tumbuland, East Griqualand, and Pondoland. There is a high degree of local autonomy administered by the Bunga (equivalent to Native Parliament) estab. in 1895. The apostles of *apartheid* (q.v.) are encouraged in their policy by the undoubted and absolute support of the policy by the Bunga. Under the policy of *apartheid* Europeans can no longer acquire property in Transkeian Terr., and it is probable that some Europeans will be dispossessed and compensated by the S. African Gov. in furtherance of *apartheid* policy. The T. is capable of much greater development, and vast sums are being spent towards this end. Pop. (Europeans) 18,413; (Coloured) 13,677; (Africans) 1,258,590.

Translation, in literature, is the art of rendering the writings of one language into another language. The art of translating lies not merely in translating the literal sense of one language into another, but of translating also the feeling, thought, and character of the work, so that the finished T. is equal in quality to the original. In FitzGerald's T. of the *Quatrains* of Omar Khayyâm, the Persian astronomer and poet, the T. is not the accessory, but the equal and even the superior of its original. See J. P. Postgate, *Translation and Translations*, 1922; Theodore Savory, *The Art of Translation*, 1957.

Transmigration, or Metempsychosis, the migration of the soul, as an immortal

essence, into successive bodily forms, human or animal. See REINCARNATION.

Transmission, see GEARING; BELTS and ROPES.

Transmission, Electric, Power, concerns the part of a supply system between the high-voltage busbars of the power station and the first substation. This part is not tapped for supply to consumers on the way. At the substation the voltage is stepped down for distribution, which is usually divided into sev. stages of decreasing voltage by intermediary substations. The stages in the Brit. Grid are 66, 33, 6.6 kV and 415/240 V. The first transmission line was opened 1891, from Lauffen to Frankfurt am Main, operating at 10 kV. The usual voltages at present are 132, 220, 275, and 380 kV. The choice depends on the distance and the amount of power to be transmitted. Up to 200 km. distance the transmission capacities are 70-90 MW at 132 kV, 250-300 MW at 220 kV, 400 MW at 275 kV, and 800-1000 MW at 380 kV. A transmission line has ohmic resistance, inductance, leakage conductance, and capacitance between lines, uniformly distributed along the length. These characteristics depend on the cross-section area of the conductors and on their spacing and, in cables, on the insulation. As a first approximation, ohmic resistance and leakage conductance may be neglected. The a.c. electromagnetic field is then propagated as a wave of wavelength 6000 km. and the instantaneous 'natural' voltage/current ratio is $\sqrt{L/C}$, the characteristic (or surge) impedance, which, for overhead lines is of the order of 500 ohms and for cables about 150 ohms, independently of the length of lines. The 'natural' power

is $E^2/\sqrt{L/C} = P \cdot \sqrt{L/C}$. Owing to the appreciable capacitance of a cable, amounting to about 0.3 μF per m., long-distance high-voltage transmission of a.c. by cables would require such charging current as to make it impracticable. Transmission by submarine cable over any distance is possible only on d.c. A line of 1500 km. length, at $f = 50$ c/s, represents a quarter-wavelength line, with standing waves of current and voltage, equivalent to a resonance circuit. In any transmission line the voltage and current along the line gradually lag behind the sending-end values and the phase angle alters. The first problem in the electrical design is to determine the sending-end voltage and current which will produce the required voltage and current at the load end, given the line length and the characteristics. An equivalent circuit is used in the first approximation: 2 parallel conductors bridged by a capacitor in the middle and with inductance and resistance evenly divided between the 2 halves of the circuit. Approx. values for the characteristics are used, subject to correction for a second approx. design. For long lines, over-excited synchronous motors or static phase-advancers (q.v.) are installed at the load end. When the power transmitted

has the value of the 'natural' power the phase angle remains constant along the line. Overhead-line conductors (q.v.) may be copper, copper-clad steel, or steel-cord aluminium, carried on poles of impregnated wood or reinforced concrete, or on steel pylons, the conductors fixed on pin-type or suspension insulators (q.v.). An earth-wire (see EARTHING) is added as protection. Modern networks are all 3-phase systems (q.v.), but experiments are now being carried out on d.c. transmission. As the amounts of power increase, higher voltages become necessary and the problem of stability becomes important on long lines. This arises from the reactive power required to compensate for the lag of the current in overhead lines, increasing along the line to the extent of endangering the working of a.c. machines. Such problems are absent from d.c. lines. A d.c. system designed by Thury has all power stations and substances connected in series. Any machine is 'disconnected' by being 'bypassed.' The system is based on constant-current supply. See DISTRIBUTION, ELECTRIC POWER; GRID SYSTEM; POWER STATIONS.

Transmitter, any piece of apparatus from which intelligence is sent out by mechanical means, by telephone or telegraph line or, more especially, by radio. A radio T. generates h.f. waves (see RADIO COMMUNICATION); it amplifies these up to the power level required for transmission, impresses upon them, the intelligence to be conveyed (see MODULATION), and finally feeds them to an aerial (q.v.) which sends them into space, subsequently to be intercepted at the receiver (q.v.).

The first stage in a T. is the oscillator (q.v.). The frequency so produced must always bear some simple mathematical relation to the final carrier frequency. Frequency multiplier stages follow the oscillator and double, treble, etc., the oscillator frequency to the required value. After this follow amplifier or 'buffer' valves which bring the level up to that required to drive the output valves, which in turn handle the power delivered to the aerial. If this power is high (several hundred kW in the case of the larger broadcasting stations) the final amplifier valves are usually operated in pairs as push-pull (q.v.) amplifiers with sev. pairs operated in phase to give the required power output. The heat produced must be abstracted by water or air-blast cooling of valve anodes in high-power T.s.

Low-power T.s. or portable, mobile, and fixed stations use powers which range from fractions of a watt to a few hundred watts according to the service. Notable among these are the equipments used by the Armed Forces for paratroop communications, etc., where a complete T.-receiver ('transceiver') is powered from dry batteries and has a range of a m. or two. Large units for vehicle use have correspondingly greater ranges, and are powered either by accumulators driving rotary transformers or by petrol-electric generators carried with them.

Special T.s. operating in the V.H.F. bands are used for mobile communications work with police forces, fire services, taxi companies, etc. They are crystal controlled, and the portable versions operate at powers of the order of 10 W. Fixed V.H.F. T.s. are of lower power than h.f. T.s., since the aerial directivity can be made much greater with consequent saving of T. rating.

T.s. for radar (q.v.) and television (q.v.) have special features. The former type are designed to be capable of producing pulses of 1 μ s or less duration having exceedingly high peak power (up to 1 MW). As these pulses are of short duration and their repetition frequency is low, the average power is small. The valves have large cathodes capable of meeting the peak emission requirements, but the anodes are designed to deal with the average power dissipation. Television T.s. must possess wideband characteristics if the full picture detail is to be radiated without distortion. The modern tendency is to design such T.s. to transmit the carrier and only one sideband, as this leads to maximum economy of frequencies and power rating of the final amplifier. The system is known as 'vestigial sideband' transmission.

See *Admiralty Handbook on Wireless Telegraphy*, 1928; A. T. Starr, *Radio and Radar Techniques*, 1932.

Transmutation of the Elements, the conversion of one chemical element (q.v.) into another. The possibility of T. is a very old belief which formed one of the central ideas of the alchemists who were searching (among other things) for the philosopher's stone which would be the agent for the turning of base metals into gold (see ALCHEMY for a hist. of the early ideas). It was known that iron when placed in a solution of blue vitriol appeared to be converted into copper and that a new substance resembling gold (really an alloy) could be made from copper and arsenic, and these and other observations appeared to confirm such possibilities. Naturally their methods were immature, and the distinction between transmutation and replacement was not appreciated. With the discovery of radium (q.v.) and radioactive substances in general a new era opened (see RADIOACTIVITY). Ramsay and Soddy found that radium bromide, by spontaneous change, gave rise to radon (a gas), and by spectroscopic examination helium gas was shown to be a product of the change. Now it is quite certain that radium itself is an element, so that here there appears to be a definite example of 1 element splitting up to give rise to 2 entirely different elements. This disintegration has been shown to be a characteristic property of radioactive bodies. When an atom loses 1 α -particle (q.v.) (a doubly ionised helium atom) its atomic weight decreases by 4 and its atomic number (i.e. number of positive charges on the nucleus) decreases by 2. On the other hand, when an atom loses a β -particle (q.v., a fast electron) its atomic weight remains unaltered, but its atomic number

increases by 1. In either case it will be noted that a new element is the product of the change (see RADIOACTIVITY). These spontaneous changes therefore do call to mind vividly the ideal of the alchemist-chemists. Natural radioactivity led to the discovery of many properties of the nucleus. Rutherford found in 1917 that natural α -particles reacted with nitrogen nuclei to form oxygen and hydrogen—the first example of artificial transmutation. Since then a very large number of such reactions have been observed, especially after the introduction of such machines as the cyclotron (q.v.) and the nuclear chain reaction (see NUCLEAR POWER) which produce beams of atomic particles. See TRANSURANIC ELEMENTS.

Transnistria, name given by Rumanians to the Rumanian zone of occupation in the SW. Ukraine between the rivs. Dniester (Rumanian Nistrul) and S. Bug in 1941–4, with Odessa as cap.

Transom, in architecture, a horizontal bar of stone, wood, or occasionally brick, across a window-opening. T.s. rarely occur before the 15th cent.

Transpadane Republic, see CISPINE R.

Transparent Ferns, see FILMY FERNS.

Transpiration, evaporation of water from the surfaces of green plants; in part directly from the cuticle or outer epidermal cells, but largely through the stomata, pore openings to the intercellular spaces in the leaves, regulated by bean-shaped guard cells, and most numerous on the undersides of dorsl-ventral leaves. Factors affecting T. are: 1. Relative humidity of the air; the amount of moisture vapour in the air governs the additional amount it can absorb from plants. 2. Temp.; T. rises and falls with the rise and fall of temp. 3. Light; stomata open as light increases, and close with darkness. Light also quickens molecular movement, and promotes diffusion. 4. Wind; the bending effect tends to pump air in and out of leaves through the stoma pores; drying air currents accelerate the rate of evaporation. 5. Nature of leaf surface; thickness of cuticle, hairiness, wax covering, and texture affect T. rate. Functions of T. are chiefly to regulate temp., by the cooling effect of evaporation; and to initiate flow of water transporting mineral salts from the soil, through and up the plant, a flow known as the T. stream. Excessive T. results in wilting. When water is forced up through the plant by root pressure more quickly than it can be transpired, drops are forced out through special glands, hydathodes, around leaf margins, and this is called guttation. Plants growing in dry situations (*xerophytes*) transpire more rapidly than plants of more normal situations (*mesophytes*) when the water supply is adequate, but apparently resist desiccation in drought by efficient stomatal control, certain xeromorphic features of form and structure, such as thick cuticle and leaf walls, sunken stomata, fleshy leaves, relatively small leaves, etc., and a protoplasmic property resistant to drying-out. See H. H. Dixon, *Transpiration and the Ascent of Sap in Plants*, 1914; *The*

Transpiration Stream, 1924; N. A. Mazimov, *The Plant in Relation to Water*, 1929; E. C. Barton Wright, *Recent Advances in Plant Physiology*, (2nd ed.), 1933; and E. C. Miller, *Plant Physiology*, 1939.

Transplanting, the removal of a plant from one situation to another. As a rule, newly germinated seedlings recover best when moved as young as practicable. Some plants, such as brassicas, benefit from the breaking of the tap root, which induces a good fibrous root system. Deciduous trees and shrubs are best transplanted in mild open weather between Oct. and Mar.; evergreens in early autumn or late spring. By spraying foliage and stems with a plastic transplanting material, plants may also be moved in full growth. It is important that roots should never be allowed to dry out, and the sooner plants can be reformed in prepared stations, the better. Some plants dislike root disturbance or breakage and are transplanted out of pots.

Transport. For land T., see BUSES AND COACHES; CARRIER, COMMON; ELECTRIC TRACTION; MOTOR CAR; MOTOR TRANSPORT, COMMERCIAL; RAILWAYS; TRAMWAYS; for sea see CANAL; DOCKS; LIGHTER AND LIGHTERMAN; LLOYD'S REGISTER; SHIPPING ROUTES; SHIPS AND SHIPBUILDING; for air T., see AIR MAIL; AVIATION, CIVIL. See also TRANSPORT ACT, 1947.

Transport, Military, process of carrying supplies for a military expedition. The armies of the Middle Ages invariably lived on the country in which they were campaigning, with the result that the inhab. were quickly rendered destitute of food and the army itself became ineffective through the impoverishment of the country. In modern armies a specialised branch of the military organisation is devoted to questions of T. and supply, and the Brit. Army, has a well-developed T. service. Road T. is worked by the Royal Army Service Corps. The supply of field units is divided into 2 echelons. 'A' echelon carries ammunition, tools, and ambulance supplies, and is in immediate contact with the fighting troops; 'B' echelon carries camp supplies, with a reserve of ammunition, tools, medical supplies, etc. Airborne supplies played a large part in the success of the Allied defence and recovery of Burma in the Second World War. See also ROYAL ARMY SERVICE CORPS; MILITARY VEHICLES.

Transport and Civil Aviation, Ministry of. The powers and duties of the Minister now relate to the following 4 categories:

1. *Inland Transport*—railways, tramways, inland waterways; roads, bridges, and ferries and vehicles and traffic thereon.

2. *Shipping*—national and international shipping policy; harbours, docks, and piers; ships and their personnel; safety of life at sea, navigation (including pilotage, lighthouses, and other aids to safety in navigation); wreck and salvage; the investigation of casualties to ships and

their personnel; coastguard; and boiler explosions at sea or on land.

3. *Civil Aviation*—the organisation, implementation, and encouragement of measures for its development; the promotion of safety and efficiency in the use of civil aircraft; research into matters relating to the navigation and operation of aircraft; general oversight of the activities of the Air Corporations; the investigation of aircraft accidents; the licensing and supervision of training arrangements for aircrews.

4. *Civil Aviation Services*—the operation of over 30 civil aerodromes, including fire and constabulary services, air traffic control, and telecommunications; technical training schools.

Transport Salaried Staffs' Association (T.S.S.A.), formerly Railway Clerks' Association (founded 1897), represents the great majority of administrative, clerical, supervisory, professional, and technical staffs employed under British Transport Commission, and Irish and Ulster Transport Authorities, and negotiates agreements on their behalf. It is a party to national negotiating machinery, and is represented on Joint Advisory Councils for training, education, welfare, etc. It is affiliated to the T.U.C. and Labour party. The membership is over 90,000; funds £1m.

Transportation. According to Stephen the earliest instances of T. as a punishment in England probably occurred in the reign of Charles II, when pardons were granted to persons under sentence of death conditionally on their being transported for a number of years, usually 7. T. was unknown to the common law (q.v.). T. was not legalised until an Act of 1719. During the 18th and early part of the 19th cents. numerous Acts were passed by which various terms of T. with alternative terms of imprisonment, and, in some cases, whipping either as an alternative or cumulative punishment, were allotted to specific offences. In 1783 convicts were first transported to Botany Bay, Australia, but this ceased in 1840, and from then until 1853 they were sent to Tasmania, which already had penal settlements. T. was gradually abolished between 1853 and 1864, principally because the colonies objected to receiving the convicts; penal servitude or imprisonment with or without hard labour being substituted. In Russia, before the Oct. Revolution, T. was a common practice, prisoners being sent to Siberia, especially to the silver mines of Nerchinsk. Many of these prisoners were transported for purely political offences. A similar system still prevails. The system was until recently still practised in France and other countries.

Transporter Bridge. see BRIDGE.

Transposing Instruments. Many wind instruments are built in fundamental tunings in which the major scale without key signature, written as C major, actually sounds higher or lower. A clarinet in B \flat , for example, will automatically play the scale of that key when the music is written in C major; or, conversely stated,

if it is to play a piece in F major, the music must be written in G major, and so on. A horn in F will transpose a fifth down, a trumpet in F a fourth up, and both will play, for example, in E \flat if their music is written in B \flat , but the former an octave lower than the latter. Among the most common orchestral instruments, Eng. horns, clarinets, horns, and trumpets are T. 1.; flutes, oboes, bassoons, and trombones are not.

Transposition. The process, either in composing or performing, of turning a piece or passage from one key into another in such a way that the music remains exactly the same except for the change in pitch. All melodic and chordal intervals thus remain of the same size, whatever the new key may be. The difficulties of T., both in writing and in playing, are somewhat mitigated by the mathematical fact that, owing to the change in key signature, all accidentals arising incidentally in the course of the music (i.e. not contained in the key signature) still remain accidentals. In a piece transposed from E major up to F major, for example, an incidental A \sharp will become B \flat , and incidental F \sharp will be G \flat , and so on. Accompanists are often required to transpose at sight when a song is too high or low for a singer's voice, and occasionally the instrumental parts of a whole orchestra have to be transposed in the same way for similar reasons. A special kind of double T. is sometimes made by horn players when they wish to play on the usual horn in F a part written for a horn in some other tuning.

Trans-Siberian Railway, longest railway in the world, from Chelyabinsk in the Urals to Vladivostok on the Pacific, 4388 m.; it was built between 1891 and 1915, most of it with record speed in 9 years, 1891-9. It greatly facilitated Russian colonisation of Siberia and the Far East. In connection with its construction large-scale geological prospecting of the Kuznetsk, Karaganda, Ekibastuz, and Chermekhovo coal basins, Amur and Kolyma gold deposits, etc., was carried out, which laid the basis for the future economic development of Siberia. A through service is operated from Moscow to Peking over the Trans-Siberian and the Changchun Railway (see CHINESE EASTERN RAILWAY) via Harbin and Mukden. A new line under construction across Mongolia will greatly shorten the route between Moscow and Peking.

Transubstantiation (Lat. *transubstantiatio*, change of substance), the change which is believed by Rom. Catholics to take place in the Eucharistic elements of bread and wine, in virtue of the consecration, viz.: the whole substance of the bread and the whole substance of the wine is changed into the Body and Blood of Christ, the accidents alone remaining. By 'accidents' is meant those qualities or conditions which produce upon the senses the impression of the presence of bread and wine.

Transuranic Elements, are chemical elements with an atomic number i.e.

number of positive charges on the nucleus, greater than that of uranium ($Z = 92$). Until 1938 no such elements were known, but in that year Hahn, Meitner, and Strassman in Germany interpreted some phenomena associated with the bombardment of uranium with neutrons (q.v.) as the emission of a β -particle from a uranium isotope (q.v.). This would be expected to produce a nucleus with $Z = 93$ (see RADIOACTIVITY), and further work by McMillan in America confirmed the existence of such an element, which came to be known as *neptunium*, symbol Np, after the planet Neptune, which lies beyond Uranus in the solar system. Several isotopes of neptunium were soon prepared, and some were β -active, thereby producing another new element, $Z = 94$, named *plutonium* (Pu), which plays such an important role in the Atom Bomb (q.v.) and Nuclear Energy (q.v.). Further elements were discovered as the result of nuclear reactions induced by α -particle or neutron bombardment, with the designations:

Z = 95,	Am	Americium,
96,	Cm	Curium,
97,	Bk	Berkelium,
98,	Cf	Californium,
99,	E	Einsteinium,
100,	Fm	Fermium,
101,	Mv	Mendelevium,
102,	No	Nobelium.

Transvaal, original prov. of the Union of S. Africa, lies immediately N. of the Orange Free State and Natal and S. of S. Rhodesia, bounded E. by Portuguese E. Africa and Swaziland, and W. by Cape Prov. and the Bechuanaland Protectorate. The Limpopo or Crocodile R. flows along its N. frontier, and the Vaal R. marks its S. border. The area of the prov., which is divided into 45 dists., is 110,450 sq. m. In 1903 about 7000 sq. m., including the dists. of Wakkerstroom, Utrecht, and Vryheid, were annexed to Natal. The pop. (census 1936) was 3,341,470 (European, 820,756; non-European, 2,520,714). According to the census in 1946 the pop. had increased to 4,183,779 (European, 1,041,835; non-European, 3,141,944). The cap. of the T. is Pretoria, which is also the administrative cap. of the Union of S. Africa (white pop. 124,500, census 1946) but the largest tn is Johannesburg, with a white pop. (city and suburbs) 330,100 (census 1946). Johannesburg is 5740 ft above sea-level and is built close to the summit of the Witwatersrand. Other large tns are Germiston, Brakpan, Springs, Benoni, Krugersdorp, Roodepoort, Boksburg, Potchefstroom, and Vereeniging. The T. is represented by 64 members in the House of Assembly of the Union. In addition, there is a Prov. Council of 64 elected members. The surface has an average elevation of 4000 ft. A plateau, called the High Veld or Hooge Veld, extends across the prov., broken here and there by low mts and detached heights. The chief mts are the Witwatersrand, lying between Pretoria and Johannesburg on the E. and Mafeking on the W.; the Lydenburg and

Barberton Mts in the dist. of Barberton; the Sand River Mts in the dist. of Waterberg; and the Murchison and Zoutpansberg ranges in the Zoutpansberg dist. The land slopes in wide plains in 3 directions: N. to Limpopo, S. to the Vaal, and E. to the sea. The High Veld forms the watershed between the basin of the Limpopo and the basin of the Vaal, their numerous tribs., including the Olifants R., the Ingalele, the Sand R., the Marico, and numerous other streams, flowing N. and S. from the Witwatersrand. The rivs. in the SE. of the prov. flow towards Delagoa Bay. The largest lake is Lake Chrissie, NE. of Ermelo, S. of the Witwatersrand Range, which forms the N. limit of the High Veld area. The climate may be regarded as not only uniformly healthy, but as perhaps the most delectable in the world. Even in summer the heat is rarely oppressive and the nights are cool; a rainfall of about 30 in. occurs generally in short and sometimes violent thunderstorms. The Berg winds, at times so oppressive on the coast, are unknown. In the winter, night frosts are frequent and winds are cold. Every few years a snowfall occurs, occasionally to a depth of sev. in. The chief industry is gold mining, extensive mines being in operation near Johannesburg, Witwatersrand, and Barberton. The output of gold has risen steadily from about 2,000,000 fine oz at the beginning of the cent. to 13,210,000 fine oz in 1954. The highest monthly value ever obtained in the T. and Orange Free State was 1,191,827 oz valued at £14,937,565. Over 95 per cent comes from the Witwatersrand.

The output of diamonds has fluctuated. The peak year since 1883 was 1910, the output for which was 2,090,068 carats with a value of £1,416,464. Ten years later the output had gone down to 905,297 carats with a value of over £3m., and in 1930 an increased output had a value of only £2m. Since 1930 there was a decline and a number of mines stopped operations. In 1939 an output of only 85,000 carats had a value of £192,000. During the war years there was a further decline, and washing operations ceased altogether. In 1954, however, diamond production in the T. was 1,431,281.00 carats from mines, valued at 42s. per carat, and 159,878.50 carats from alluvial diggings, valued at 74s. 11d. per carat. The largest diamond mine in the T. is the Premier Mine, 25 m. E. of Pretoria; it yields the great bulk of the T. mine stones. The prin. sources of alluvial diamonds are in and near the bed of the Vaal R., in the SW. T.; it was on 16 Jan. 1905 that the 'Cullinan', the largest white diamond, was found; its weight was 3024½ carats (1½ lb.). Coal has become important, the value of production in 1949 being over 19,000,000 tons, valued at over £6,300,000. The output of copper ore averaged at 13,000 tons in the 10 years 1930-40, with a value of £1,206,700 in 1949. Other minerals are tin, chromium, manganese, nickel; platinum was discovered in 1923.

In addition to the export of minerals, there are large exports of horses, mules,

tobacco, coal, wool, clothing, jewellery, skins, hides, horns, machinery, hardware, and coaches. The T. has iron and brass foundries and engineering works, grain mills, printing works, tobacco factories, brick and tile and pottery works, breweries, coach and wagon works, soap and candle factories. Agriculture is also a prominent industry and continues to grow in importance. The production of wheat on European farms for 1949 was 433,869 300-lb. bags; but the larger crop is maize, the annual production on European farms for 1949 being 10,388,190 200-lb. bags. Stock raising is the most important agric. occupation; the veld supports large numbers of cattle, horses, sheep, and pigs (the live-stock in 1949 numbered close upon 4,000,000 cattle, 3,000,000 sheep, 1000 goats, 300,000 pigs). The ann. expenditure of the prov. is within the normal revenue (£49,177,113 for 1949).

There are in the T. 761 primary and secondary public schools and 52 high schools for Europeans, with over 184,500 pupils; 1,269 state and state-aided schools for coloured, native, and Indian children, with nearly 320,000 pupils; and 4 training institutions for European teachers, and 12 for coloured teachers. No doctrine or dogma peculiar to any religious denomination or sect may be taught in these schools. The Dutch churches take first place, being followed by the Anglican, Presbyterian, Methodist, Rom. Catholic, Apostolic Faith Mission, Lutheran.

History. The T. was practically unknown before the advent of the Boers, who trekked from Cape Colony in 1836-7, first came into collision with the Matabele in the vicinity of Kroonstad in the Orange Free State, and finally drove them from N. of the Vaal, which they crossed themselves in 1836. Under the command of Hendrik Potgieter, they drove the Zulu warriors of Moselekatse, the revolted gen. of Chaka (successor of Dingiswayo, chief of the Ababewu, and leader of a confederation of warriors of Zululand), across the Limpopo. After the overthrow of Dingaan, the successor of Chaka, by Pretorius, the independence of the rep. was acknowledged by Britain at the Zand R. Convention of 1852, and Marthinus Wessels was elected president 3 years later. The Boers were constantly at war with the natives, especially on the N. and E. borders, and in 1876 a commando was sent to attack Sekukuni, a native chief living S. of the Olifants R., which, however, was defeated. This reverse caused the Transvaalers to appeal to Britain for help. In consequence of their financial difficulties and troubles with the natives, the country was annexed by Britain in 1877 by Sir Theophilus Shepstone. Three years later the Boers took up arms for the restoration of their independence, and after the fall of Colley at Majuba Hill, they gained their object in 1881, subject to the suzerainty of the Brit. Gov. Gold had been worked since 1869, but it was the discovery of the Witwatersrand goldfields in 1886 which opened up the country to prospectors. It brought a great influx

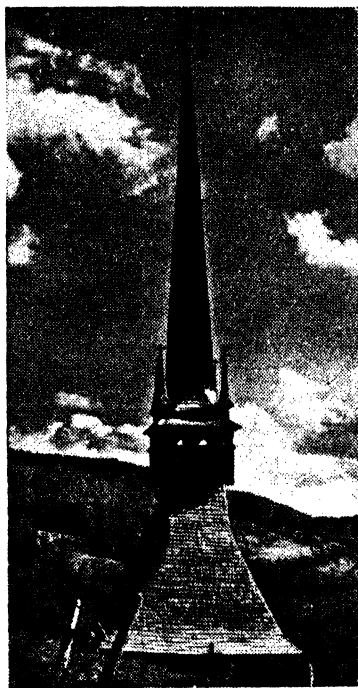
of 'Uitlanders,' who were looked upon with considerable disfavour by President Kruger. Difficulties arose, leading to the Jameson Raid and the gauntlet being thrown down to Britain in 1899, culminating in the Boer war, which resulted in the loss of Boer independence in 1902. On 31 May 1910 the T. was merged in the Union of S. Africa. (See SOUTH AFRICA, UNION OF.)

See H. Cloete, *History of the Great Boer Trek*, 1899; W. C. Willoughby, *Native Life on the Transvaal Border*, 1900; P. Kruger, *Memoirs of Paul Kruger*, 1902; W. J. Leyds, *The First Annexation of the Transvaal*, 1906; G. McCall Theal, *History of South Africa since 1796*, 1916-20; C. L. Harries, *Laws and Customs of the Bapedi of the Transvaal*, 1929; A. K. Bot, *A Century of Education in the Transvaal*, 1936; *Cambridge History of the British Empire*, vol. viii, 1936; D. Jacobsen, *Fifty Golden Years of the Rand*, 1936; J. Gray and E. L. Gray, *Payable Gold*, 1937.

Transverse and Transversal, in geometry, the straight line intersecting 2 parallel straight lines. The angles formed are thus related: (1) alternate angles are equal; (2) the exterior angle is equal to the interior and opposite angle on the same side; (3) the sum of the 2 interior angles on the same side is equal to 2 right angles.

Transylvania, prov. of Rumania. The Carpathian Mts bound it to the E. and N., the Transylvanian Alps to the S., the Munții Apuseni to the SW. and lower hills to the NW. The area is 22,312 sq. m. The surface is tableland, mountainous over the greater part, and is watered by the numerous affluents of the Pruth and the Tisza. The minerals include gold, silver, copper, iron, quicksilver, lead, and salt. Stock-raising, agriculture, and fruit-growing are important industries; wine is made and brandy distilled. A fertile plain in the centre of the country yields large crops of maize, wheat, rye, flax, hemp, potatoes, and tobacco. There are 5,500,000 ac. of forest. Cluj (former Kolozsvár or Klausenburg), Salin (Bragov, Brassó, Kronstadt), and Sibiu (Nagyseben, Hermannstadt) are the chief tns. A univ. was founded at Cluj in 1919. Pop. 3,100,000, consisting of Rumanians, Magyars, and Germans. T. corresponds with the Rom. Dacia, which was overrun by the Huns under Attila in the 5th cent. This invasion was followed by incursions from the Gepidae, the Avars, the Slavs, and the Magyars under King Stephen of Hungary, who appeared at the close of the 9th cent. and won T.'s alliance in 1002. In the 13th cent. many thousands of Germans settled in T., which in the 16th cent. became a principality when John Zapolya, the voivode of T., threw off his allegiance to the emperor and acknowledged the suzerainty of the sultan. In the early part of the 19th cent. efforts were made to bring about a union with Hungary, which ended in T. being made a crown land of Austria in 1849. In 1868 the principality was merged into the Austro-Hungarian empire. As a result of the First World War Rumania gained accessions of ter., including T. (confirmed by

the treaty of St Germain, 1919). In Aug. 1940 Hungary with Ger. support demanded the return of T. A settlement was then imposed by Germany and Italy. By the resulting Vienna award (30 Aug. 1940) some three-quarters of T., comprising 17,000 sq. m. and a pop. of 2,500,000, was ceded to Hungary, including valuable mines and agric. and forest land. The Russian Army entered T. in Aug. 1944, and on 10 Mar. 1945. the ter.



Rumanian Legation

A WOODEN CHURCH IN TRANSYLVANIA

was restored to Rumania. This was confirmed by the peace treaties between the Allied and associated powers with Rumania and Hungary (10 Feb. 1947). By the terms of these treaties the 1938 frontiers between Rumania and Hungary were restored, placing T. in Rumania. See E. Gerard, *The Land Beyond the Forest*, 1888; L. von Sawicki, *Beitragen zur Morphologie Siebenbürgens*, 1912; N. Jorga, *Histoire des Roumains de Transylvanie et de Hongrie*, 1915-16; J. Cabot, *The Racial Conflict in Transylvania*, 1926; W. Starkie, *Raggle-Taggle*, 1933, 1947; T. G. Ciupagea, *Nouvelles données sur la structure du bassin transylvanien*, 1935.

Trap, term applied vaguely, in geology, to any dark-coloured fine- or medium-grained basic igneous rocks, such as dolerite and diabase. Mica-trap is the name applied to mica-lamprophyre. These trap rocks occur as dyke rocks and lava flows.

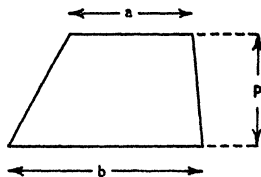
Trapani: 1. Prov. of Italy, in W. Sicily (q.v.). It has coast-lines on the N., W., and S., and there are mts in the N. and E. The chief rivs. are the Belice, Mazara, Bordinio, and Fredo. The prin. tns include T., Marsala, Castellammare del Golfo, and Alcamo (qq.v.). Area 965 sq. m.; pop. 422,000.

2. (Anet Drepana), seaport in Sicily, cap. of the prov. of T., 44 m. WSW. of Palermo (q.v.). It is on the NW. coast, and was once the port of Eryx (q.v.). In a naval battle here in 249 BC Carthage (q.v.) was victorious over Rome; and in a naval battle in 1266 the Venetians here defeated the Genoese. During the Second World War there was much damage. T. has a cathedral (1635) and some fine baroque buildings. It has salt, wine, macaroni, and tunny-fishing industries. Pop. 71,800.

Trapassi, Pietro Antonio Domenico Bonaventura, see METASTASIO.

Trapeze Artist, see ACROBAT.

Trapezium, a quadrilateral having one pair of opposite sides parallel. Area = $\frac{1}{2}(a + b)p$.



Trapezoid is sometimes used for a quadrilateral in which no pairs of sides are parallel.

Trapezus, see TRABZON.

Trapping and Trappers. The art of capturing or killing animals by means of traps has been practised since prehistoric times, and is one of the oldest in existence. The earliest trap was probably the simple pitfall, a cavity dug in the ground into which the unsuspecting victim fell. A variation of this type of trap is a cage into which the victim is lured but from which it cannot escape. A second type of trap is a mechanical device, or perhaps a snare made of cord or wire, which seizes the victim and holds it without killing it. There is also a third type of trap, of which there are various forms, designed to kill rather than merely to capture the victim.

Trapping is practised to some extent in many parts of the world where game animals form part of the food supply, but it is chiefly used as a means of capturing animals in order to secure their pelts or furs without damage. Since the fur-bearing animals live in the cold N. climates, N. Canada and the N. parts of the U.S.S.R. are the prin. areas of the

world where trapping is carried on on a large scale for commercial purposes. In Canada it was the possibilities of the fur-trade that led to the founding of Quebec by Champlain in 1608 and to the further exploration and opening up of the interior. During the whole period of Canada's early hist., furs remained the prin. article of commerce and the basis of the country's economy. Furs still contribute many millions of dollars annually to the national income (over \$24m. in 1952), and although fur-farming has developed rapidly during the present cent. nearly 80 per cent of the total ann. value is provided by trapping. Wild fur-bearers are still taken in moderate numbers in settled parts of Canada, but settlement has so reduced their numbers that the main trapping areas are now N. Ontario, the N. parts of the Prairie provs., and the NW. Ters. The season for trapping, of course, is in the winter, when the animals' furs are in the best condition. Muskrat and squirrel provide the greatest numbers of pelts taken annually; mink, beaver, and muskrat lead in value.

The numbers of some fur-bearing animals are subject to marked fluctuations from year to year, and changes in fashion, causing fluctuations in the demand for particular kinds of fur, also affect the ann. 'take.' For these and other reasons, the conservation and management of fur-bearers is receiving increasing attention in Canada from federal and prov. authorities. All Canadian provs. and ters. now have trapping regulations, and individual trappers are licensed. Some provs. register trap-lines, while others register trapping areas. Responsibility is put upon individual trappers to conserve the wild-life in their own areas and to guard against practices which may deplete or wipe out the local pops. of fur-bearers on which their livelihood depends.

The most important aspects of management of the fur-trapping industry are: constant scientific research, maintenance and improvement of habitat, regulation of the harvest of fur-bearers, provision of competent and adequate field staffs, and free education of trappers in the principles of wild-life management. By these means many areas depleted of fur-bearers have once again become productive.

Trappists, name usually given to a branch of the Cistercian order reformed by Dominique Armand Jean le Bouthillier de Rancé (1626-1700). Until the age of 34 de Rancé led the voluptuous life of a courtier-priest. Then in 1660 a sudden change came over him and he retired to live a life of austerity and devotion in the Cistercian abbey of La Trappe, which had long formed part of his possessions. The abbey, which had been founded about the middle of the 12th cent. was lax in discipline, and it was with the greatest difficulty that de Rancé introduced his strict observance. The new community devoted itself to the observance of strict silence and seclusion from the world, to hard labour, to total abstinence from wine, meat, eggs, fish, and all seasoning of

their simple diet of bread and vegetables. The reform of La Trappe spread to other houses, and is found to-day all over the world, even in China. The prin. Trappist monasteries in the Brit. Is. are at Mount St Bernard, Leicestershire, Caldey Is., St. Wales, and Mount Melleray and Roscrea, Ireland. See L. F. Du Bois, *Histoire de La Trappe*, 1924; Y. von Estienne, *Les Trappistes*, 1937; T. Merton, *Elected Silence* (in U.S.A., *Seven Storey Mountain*), 1949.

Trasimene Lake, also known as Lake Perugia, in Umbria, Italy. In 1898 it was partially drained into the Tiber, some 5500 ac. of land being reclaimed. It is famous for Hannibal's great victory over the Romans under Flaminius, gained on its shores in 217 BC.

Trás-os-Montes e Alto Douro, prov. of N. Portugal, containing the dists. of Bragança and Vila Real, and parts of the dists. of Guarda and Viseu (qq.v.). It is generally mountainous, and is crossed E.-W. by the valley of the Douro (q.v.). The prin. tn is Vila Real. Area 4569 sq. m.; pop. 636,350.

Traumatic Neurosis, see SHELLSHOCK.

Traun, Lake, see SALZKAMMERGUT.

Trautenuau, see TRUTNOV.

Travancore, former state of India, stretching along the Malabar coast from Cape Comorin to Cochin, its shores being washed by the Indian Ocean. It is 140 m. long, with a maximum breadth of 70 m. The coast is low, but the foothills of the W. Ghats diversify the scenery and slope towards the ocean. Its cap. is Trivandrum. Since 1949 T. has formed part of the joint State of Travancore-Cochin. It has the reputation of having the highest standard of literacy in India, and the univ. (1935) was founded by the Maharajah. It is identified with the anc. Kerala, and together with Cochin and the Malabar Dist. of Madras State is the area where the language Malayalam is spoken, now Kerala State.

Traveller's Joy, see CLEMATIS.

Traveller's Tree, or *Ravensala madagascariensis*, tree with long and large fan-shaped leaves, the petioles or leaf stalks of which form a large cavity at their base, in which water collects, forming a useful store for travellers and animals.

Traverse, in pleadings, means denying the whole or some essential part of the averments of fact contained in the opponent's pleading. There are 2 other ways of dealing with the opponent's pleading, namely, by *confession* and *avoidance* (q.v.) and by an *objection in point of law*. Formerly the party pleading had to elect which of these 3 courses to adopt, but now he may adopt either or any of these methods, though a good pleader will not multiply the issues needlessly, for the client may be ordered to pay the costs of the issues on which he fails. A T. cannot be made to do the work of a plea in confession and avoidance; its office is to contradict, not to excuse. Matter justifying an act may not be inserted into a plea which denies the act. As a rule the burden lies on the opponent to prove at the trial the facts which are

traversed in the pleadings. There are 3 fundamental rules in traversing: every allegation of fact, if not denied specifically or by necessary implication or stated to be not admitted in the pleading of the opposite party, will be taken to be admitted (except as against an infant, lunatic, etc.); each party must deal specifically with each allegation of fact of which he does not admit the truth, except damages; and when a party denies an allegation of fact in the previous pleading of the opposite party, he must not do so evasively, but answer the point of substance.

Traverse City, city, co. seat of Grand Traverse co., Michigan, U.S.A., on Grand Traverse Bay of Lake Michigan in orchard, farm, resort area, with fisheries. It has some manufs. Pop. 17,000.

Traverser Bridge, see BRIDGE.

Travertine, or **Calc-sinter**, is porous calcareous material produced from mineral springs (q.v.). There are well-known T. deposits at Tivoli, near Rome, and in the Auvergne dist. of France. T. may be chalk-like in texture, but is often hard enough for building stone, many of the buildings in Rome (e.g. St Peter's) being built with it. At San Filippo the T. is deposited at the rate of 3 ft a year.

Travnik, tn in Bosnia-Herzegovina, Yugoslavia, on the Lašva. It is Oriental in appearance, has an anct citadel and Turkish walls, and was once the seat of the viziers of Bosnia. Pop. 12,900.

Trawling, see FISHERIES.

Treachery, see TREASON.

Treacle, see MOLASSES.

Treadmill, known as 'the everlasting staircase', worked by persons treading on steps fixed on the periphery of a wheel. It was once used as a means of prison discipline, or to give useful employment in the shape of grinding corn or moving machinery to persons imprisoned for crime, and came under the category of 'hard labour.' The prisoners held on to a hand rail and worked in separated compartments, the speed being regulated by a warder by means of a lever.

Trearddur, see HOLY ISLAND.

Treason, treachery against the sovereign. By the Statute of Treasons, 1351, it is T.: (1) To compass the death of the king, queen, or their eldest son. 'Compass' imports design, which must be manifested by an overt act (e.g. providing weapons), for idle words do not now constitute T., though they may amount to a misdemeanour. The conviction of Peacocks and Sydney shows that the commission, even without pub. of 'treasonable' ideas, to writing is T., but it is extremely doubtful whether a modern judge would direct a conviction for T. at the present day. (2) To violate the king's companion, eldest unmarried daughter, or eldest son's wife. (3) To levy war against the king in his realm. This includes levying war to reform religion, remove councillors, or redress grievances, inasmuch as private persons may not forcibly interfere in grave matters, e.g. in Anne's reign Darnley and Purchase were convicted of T. for burning certain dissenting meeting-houses, the court inferring a

general design against the State. (4) To adhere to the king's enemies in his realm by giving them aid in his realm or elsewhere. The overshadowing power of present-day central govs. makes it grotesque for any individual to hope to approach a project of rebellion in England with the prospect of even partial success. When the case of R. v. Lynch (1903) came before the courts there had not previously been a charge of high T. tried for 62 years. It was moved to quash the indictment (q.v.) in this trial on the ground that each count charged an adhering 'without the realm' (viz. in the Transvaal), and so disclosed no statutory offence. The court held that the statutory words did not mean merely that the accused *being in the realm* has been adherent to the king's enemies *wherever they were*, for that so narrow a construction not only would enable an Englishman to engage with a hostile Power against his own country so long as he took care to remain abroad, but also makes the words 'or elsewhere' meaningless. (5) To counterfeit the king's seal or money or to import money (not now T.). (6) To slay the chancellor, treasurer, or king's justices. The punishment for T. was formerly hanging, drawing, and quartering after the traitor had been dragged to the place of execution on a hurdle; it is now hanging only. T. cannot be committed against a *de jure* king who is not also *de facto* king. In the case of Roger Casement (q.v.) in 1916 it was decided that a man may 'adhere to the king's enemies in his realm' and be found guilty of T. whether the act complained of was committed within or without the realm.

Early in the Second World War a new Treachery Bill was passed in the House of Commons. Its object was to close up any legal loophole which might be found in the anct statute and its interpretations; for instance, it was not clear to whom the former Acts could be extended and whether they applied to all aliens or only those normally living within the king's jurisdiction. They might, in consequence, be held to be inapplicable to aliens coming into this country under the guise of refugees for the sole purpose of espionage or sabotage. Secondly, the crime of T., because of its gravity, was accorded a special form of trial, and it was in order to avoid a cumbersome procedure that the new Bill was necessary, so that persons accused of treachery under Clause 1 could be tried in accordance with the ordinary procedure of the courts. The third reasons why new legislation was thought advisable was to make provision whereby enemy aliens could be tried in suitable cases by court-martial, though any Brit. subject or neutral alien retains the right to be tried by jury. Finally, in accordance with the old Treason Laws, the Treachery Bill imposes the death penalty for persons found guilty under it.

The trial of William Joyce for T. in 1945 (appeal dismissed by the Court of Criminal Appeal, 7 Nov. 1945, and by the House of Lords, 31 Jan. 1946), estab. important points of legal principle. The

majority judgment decided that an alien can in law be guilty of T. to the sovereign in respect of an act committed outside the realm. The case establishes that an alien, as long as he holds a Brit. passport, commits T. within the meaning of the Statute of 1351, if he adheres to the queen's enemies. In effect, a passport issued by the Brit. authorities imposes on an alien the obligation of allegiance to Her Majesty; and that obligation is equally binding within and without the realm.

By the constitution of the U.S.A., T. consists in levying war against them or in adhering to their enemies, giving them aid and comfort. The punishment by an Act of 1790 is death by hanging; it was altered at the time of the Civil war to death, or at the discretion of the court imprisonment for at least 5 years with hard labour and a fine of not less than \$10,000; this included disability to hold office. In some state constitutions there are provisions for T. against the State as distinct from the Federal Gov.

See also CRIMINAL LAW; POLITICAL OFFENCES; ROYAL FAMILY.

'Treasure State,' see MONTANA.

Treasure Trove. Money, plate, or similar articles discovered hidden in the earth or some other secret place after so long a time that the owner is unknown. In default of finding the owner, the estab. principle of Eng. law is that the Crown is entitled to the treasure. Finders are legally entitled to obtain the market value of their discoveries without any deduction for expenses. The chief finds in Great Britain are of gold and silver coins, and the orthodox definition of T. T., 'objects of gold or silver which have been hidden in the soil or in buildings, and of which the owner cannot be traced,' is repeated in the leaflet issued by the Brit. Museum on the agreement, which points out that finders should report to the coroner either direct or through the police or the Director of the Brit. Museum. If the objects are retained by the Crown or a museum the finder will receive their full antiquarian value; if not retained he will receive back the objects or, if he wishes it, the Brit. Museum will sell them at the best price obtainable. See LOST PROPERTY. See G. F. Hill, *Treasure Trove in Law and Practice*, 1936.

Treasury, central dept of State concerned with the management of the financial resources of the U.K., control of public expenditure, and supervision over the Civil Service (q.v.); it also co-ordinates general economic policy and planning. The origin of the T. Board, consisting of a number of lords commissioners, was the occasion in 1612 on which the office of Lord High Treasurer was first put into commission; the Board has been continuously in commission since 1714. With rare exceptions the First Lord of the T. has, since 1721, been the Prime Minister. The Chancellor of the Exchequer as Second Lord of the T. is its effective head, and he has 2 ministerial assistants, the Financial Secretary and the Economic Secretary.

Treasury Bill, form of Brit. Gov. security, specially suited for temporary borrowing. Introduced in 1877, T.B.s are sold by tender to banks and financial houses at the lowest rate of interest that can be obtained. They are issued in multiples of £5000, normally repayable in 91 days. At 31 Mar. 1956, £4,788,020,000 T.B.s were outstanding, or nearly one-quarter of the total internal unfunded debt.

Treasury Solicitor, legal adviser to the Treasury and gov. depts not having their legal advisers. He deals with such intestate estates as escheat (q.v.) to the Crown. He is generally a qualified barrister. As to his duties in his capacity of Queen's Proctor, see that title.

Treating, see ELECTIONS.

Treaty. The T.-making power is the prerogative of the Crown (q.v.), as is the power to conclude peace. In negotiations for a T. the minister representing the Supreme Authority in the country with whom the T. is to be made is first sent an instrument under the Great Seal (see SEAL) containing the authorisation to sign a T. The T. itself usually contains a clause providing for its ratification by both sides, and until the ratifications are exchanged neither party is bound by the T. The Crown is in theory the sole T.-making power in England, but it seems to be a settled principle that a T. which lays a pecuniary burden on the people, or which alters the law, requires parl. sanction.

In the U.S.A. T.s are negotiated by the President, but have to be ratified by the Senate, which has often refused to ratify negotiated T.s, or at times claims the right to ratify only a portion of the projected T. Even after ratification Congress may, in its turn, withhold the necessary legislation to carry the stipulations of the T. into effect.

As T.s cover the entire sphere of international relations, no satisfactory classification is possible. They may operate for a definite or indefinite period. They usually exist for some specific purpose, e.g. the definition of boundaries, reciprocal extradition (q.v.) or commercial arrangements, defensive alliances, guarantees of neutrality or assistance. It is important to distinguish between mere private arrangements concerning 2 or more states and those which are concluded by a number of leading states for the purpose of supplementing or amending existing provisions of international law or, in other words, law-making T.s, e.g. The Hague Conventions, the Declaration of Paris (q.v.), 1856, the Covenant (q.v.) of the League of Nations, 1919, and the Charter of the United Nations (q.v.), 1945. A T. of guarantee may be collective or joint and sov., whereby a guaranteeing state would be obliged to fulfil, if necessary, its obligations alone even though its co-guarantors refused to fulfil their obligations. An historic example of such T. was the Quintuple T. of 1839 (the 'scrap of paper') (see QUINTUPLE TREATY), which estab. the neutrality of Belgium. For the states members of the League of Nations the condition precedent of registration of

a T. had to be satisfied before the T. came into force. By Art. 18 of the Covenant every T. or international engagement entered into by any member of the League had to be registered with the secretariat and be pub. by it, and would not be binding until it was registered. The constituent parts of the U.N. organisation were, at first, almost identical with those of the old League of Nations; but the later Dumbarton Oaks (q.v.) document was very different from the Covenant of the League. For, by reason, no doubt, of the fact that the moral aspirations of the Covenant ultimately came to nothing, the Dumbarton Oaks conference produced a plan that invoked no principles, but contained practical arrangements for restraining an aggressor, leaving it for the Yalta conference (q.v.) to decide on the rules for voting in the Security Council (see also SAN FRANCISCO CONFERENCE). The Charter of the U.N. provides that all T.s must be registered with the secretariat and pub. by it, otherwise they will not be recognised by the U.N. organisation. Obligations under the Charter override any other T. obligations for members of the U.N. T.s affecting the rights of third parties cannot be said to be abrogated or even suspended by war except in so far as war causes for the time being difficulties of performance. But the practice is by no means uniform: e.g. after the Crimean war, fresh T.s of commerce were concluded; after the Turco-It. war the T. of Lausanne (q.v.), 1912, renewed all T.s and engagements of every kind existing before that war; and after the First World War the T.s of peace revived a number of multilateral T.s of an economic or technical character, in some cases introducing new clauses. With regard to bilateral T.s, each of the Allied states was empowered to revive such of its T.s with the ex-enemy states as it wished.

In the U.K., subject to possible exceptions, a T. has no effect on private rights, and if the Crown concludes a T. which is intended to modify such rights, it must obtain an Act of Parliament to give it that operation. In the U.S.A. it is otherwise, for the 6th Art. of the Constitution provides that 'all T.s made or which shall be made under the authority of the U.S.A. shall be the supreme law of the land, and the judges in every state shall be bound thereby, anything in the constitution or laws of any state notwithstanding.' Hence when the 9th Art. of the Jay Treaty in 1794 enabled the subjects of either country to hold lands in the other, and to sell or devise them as if they were natives, this stipulation at once took effect in the U.S.A. in favour of Brit. subjects, repealing of itself so much either of common law or of statute law on the disabilities of aliens as stood in its way; while in England an Act of 37 Geo. III had to be passed to give effect to the reciprocal stipulation in favour of the citizens of the U.S.A. See *The Collected Papers of John Westlake on Public International Law*, ed. by L. Oppenheim, 1914. See also bibliography of INTERNATIONAL LAW.

Treaty Port, name given to certain seaports in China which were open to European trade by treaty, China being peculiar in that inland navigation was permissible to foreign vessels only by treaty. The earliest of these treaties was that of 1842 following a war between Britain and China. Before the Second World War there were over 40 T.P.s, being all the chief ports of the country. Between 1943 and 1947 the Treaty Powers relinquished the extra-territorial rights and privileges in China for which the various treaties made provision.

Trebbia, or **Trebia**, riv. of Italy, which rises in the Ligurian Mts (see APENNINES) and flows N. across Emilia-Romagna to join the Po (q.v.) W. of Piacenza. Hannibal (q.v.) gained a victory over the Romans on its banks in 218 bc. Length 48 m.

Trebiz, or **Trebizond**, see TRABZON.

Treble, highest voice in a vocal composition in sev. parts, derived from the Lat. *tripulus*, which was the top part of the earliest 3-part motets. T. is now often taken as the synonym of soprano, but strictly it is so only if it denotes the soprano part in a composition for sev. voices. The term is also loosely used for a top part in an instrumental composition.

Tredegar, tn of Monmouthshire, England, on the Sirhowy, 26 m. N. of Cardiff, and 21 m. NW. of Newport. The chief industries are coal mining and light engineering. The title of Baron T. has been borne by the family of Morgan since 1859, the family seat being T. Park, near Newport. Pop. 20,375.

Tree, Sir **Herbert Beerbohm** (1852-1917), actor-manager, b. London, second son of Julius B. Educ. in Germany, he took the name of T., and made his first appearance on the stage in 1876. His first great hit was as Rev. Robert Spalding in *The Private Secretary*, 1884. Manager of the Haymarket Theatre, 1887-96, he was thenceforth proprietor and manager of Her (His) Majesty's Theatre. He was knighted in 1909. T. was especially famous for his productions of Shakespeare's plays. His *Thoughts and Afterthoughts* were pub. in 1913. His greatest strength lay in the presentation of 'character' parts such as Pugin in *Oliver Twist*, D'Orsay in *The Last of the Dandies*, Malvolio in *Twelfth Night*, Richard II, Falstaff, and especially Svengali in *Trilby*. See life by Max Beerbohm, 1920.

Tree, perennial plant with a woody stem and branches, differing only in size from a shrub. In classification, as in the plant-kingdom generally, trees are divided into 2 groups, the angiosperms (q.v.) and the gymnosperms (q.v.). There are 4 classes of the latter, the cycads, maiden-hair trees, gnetum, and conifer. The angiosperms are further classified in 2 great groups, the monocotyledons (q.v.), and the dicotyledons (q.v.), distinguished by the fact that the seedling of the former produces first a single seed-leaf, and of the latter a pair. The monocotyledons are peculiar in form. One great family, palm, consists entirely of T.s. Among the

grasses is found the tree-form in, e.g. some of the bamboos. In the lily family T.s are represented by the yuccas of Mexico and the dragon-trees of the Canary Is. It is in the dicotyledons that are found the more typical and important T.s.

T.s are either deciduous, as the oak and elm, or evergreen, like the pine or holly. In palms and some other trees the terminal bud of the primary stem is the only one to develop, and thus a long, unbranched trunk is formed. T.s do not often exceed 300 ft (the greatest authentic height is 364 ft—a Californian Redwood). The eucalypts of Australia and the conifers of Brit. Columbia and Washington also often approach 250 ft or more. See also AGE OF TREES; ARBORICULTURE; BOTANY; FORESTRY; FOSSIL PLANTS; TIMBER; TREE-WORSHIP; and under names of T.s.

Tree-bear, or Kinkajou (*Potos flavus*), small cat-like mammal of the racoon family (Procyonidae). It is long and feline in body, is covered with soft, yellow-brown hair, and has a remarkably long prehensile tail. It is found in Central and S. America.

Tree-creeper, small Eng. bird, the *Certhia familiaris*. See CERTHIIDAE.

Tree-fern, fern with a trunk-like rhizome, somewhat resembling a tree in structure. Many T.s belong to the family *Cyatheaceae* (q.v.).

Tree-frog, name given to members of the family Hylidae. They are widely distributed, especially in America, but absent from Britain. The Common T. (*Hyla arborea*) is about 1 in. in length, bright leaf-green above and white underneath, and possesses some powers of colour change. The male is able to croak very loudly by means of a very distensible throat sac. The digits bear adhesive discs, with which it readily climbs even up grass.

Tree-worship, in some form or other, is v. common. In Europe, the veneration of trees as sacred or the abode of deities survived late, and is found in many of the accounts of early Christian missions in the N. The veneration of the sacred oak featured in the old Prussian religion, and the oak and its parasite the mistletoe were sacred to the anc. Britons. In Lithuania this cult lasted to the 14th cent. T. is of 2 types. In the more primitive the tree is itself regarded as an animate being. In the later and commoner form it is thought of as the residence of a separate being whose fortunes, however, are sometimes bound up with those of the tree.

Trefoll, common name of Trifolium (q.v.) species. Bird's-foot T. is *Lotus corniculatus*; Moon T., *Medicago arborea*; scented T., *Melilotus* species.

Treforest, see under PONTYPRIDD.

Treforet, Jeanne, see HADING, JANE.

Tregaron, mkt tn of Cardiganshire, Wales, 18 m. from Aberystwyth. Pop. 800.

Tréguier, tn in the dept of Côtes-du-Nord, France. It has a splendid 14th-cent. cathedral. T. was the bp. of Ernest Renan (q.v.) Pop. 3000.

Treharris, vill. in the co. bor. of Merthyr Tydfil, Glamorgan, Wales, 8 m. S. of Merthyr Tydfil. It is a coal-mining area. Pop. 7500.

Treinta y Tres, dept of Uruguay (q.v.). Area 3682 sq. m.; pop. 69,000. Its name celebrates the Thirty-three Patriots whose rising ensured the country's complete independence from Sp. and Argentine domination. This was finally achieved in 1823. Also the name of its cap., a picturesquely situated tn near the Olimar R., it is on a branch line of the Central Uruguayan Railway leading to the Brazilian frontier, and trades in cattle, sheep, and rice. Pop. 21,500.

Treitschke, Heinrich von (1834-96), Ger. historian and political writer, b. Dresden, Saxony, and educ. at the univs. of Bonn, Tübingen, and Heidelberg. In 1859 he obtained his doctorate at the univ. of Leipzig with the essay *Die Gesellschaftswissenschaft: Ein kritischer Versuch*. This little work determined his future career. T.'s ideas are found in the statement that the science of human society and the science of the State should be the same thing; that the State should be the organised society; and although he was without concrete knowledge of the spirit of the Brit. society and State he mentions England as the example of his theory. He was already both theorist and practical politician, arriving at the conclusion that if Germany was to become united she must be so as a 'Nationale Staat' and under Prussian leadership. He followed this theory throughout his life.

From 1863 until 1866 he was lecturer in hist. at the univ. of Freiburg in Baden. After the Austro-Prussian war he urged Prussia to incorporate the whole of Saxony; thus he, as a Saxon, became a Prussian from choice, and was lecturer at the univ. of Kiel for a short time. From 1867 to 1873 he was in Heidelberg, and in 1874 settled in Berlin for the rest of his life. In 1886 T. became the successor to the famous Prussian historian, Ranke, with the title 'Historiograph des Preussischen Staates.' During these years 8 books were pub., most of them works on political hist. When the new Ger. Empire was founded in 1871 under Prussian leadership, he became a member of the Ger. *Reichstag* as a National Liberal. But this party became too liberal for his feelings, and he left it, without, however, attaching himself to another party. His greatest achievement was *Deutsche Geschichte im neunzehnten Jahrhundert*, and in the years 1879-94 5 vols. of this work were pub.; but when he died the work covered only the years till 1848.

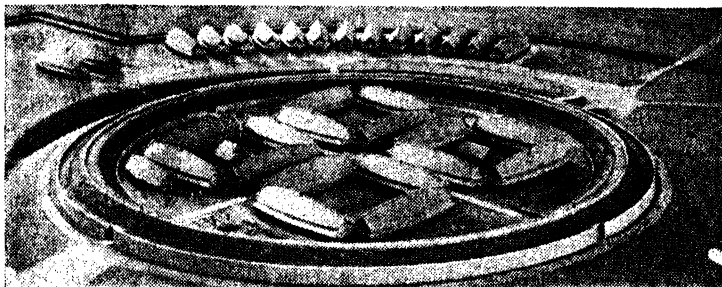
See G. P. Gooch, *History and Historians in the Nineteenth Century*, 1913; H. W. C. Davies, *The Political Thought of Heinrich von Treitschke*, 1914; F. Meineke, *Die Idee der Staatsräson* (3rd ed.), 1929; H. Kohn, *Völker und Führer*, 1944; A. Hausrath, *Life and Works* (Eng. trans.), 1914.

Trek, Afrikaans (q.v.), word in common use throughout S. and E. Africa meaning a distance travelled or a journey.

Trelawny, Edward John (1792-1881), traveller and biographer, *b.* London. He joined the Navy, but deserted from it. In 1821 he met Shelley and Byron in Italy, and after Shelley was drowned he was present at the cremation of the body. In 1823 he went with Byron and took part in the Gk struggle for independence. Later he was a distinguished figure in London society. He wrote an autobiography, *The Adventures of a Younger Son*, 1831, and *Recollections of Shelley and Byron*, 1858, later republished as *Records of Shelley, Byron, and the Author*. His *Letters* were ed. in 1910 by H. Buxton Forman. See H. J. Massingham, *The Friend of Shelley, a Memoir of Trelawny*, 1930; Rosalie G. Grylls, *Trelawny*, 1950.

Trelawny, Sir Jonathan (1650-1721), divine, *b.* near Pelynt, Cornwall, held successively the bishoprics of Bristol, Exeter, and Winchester. In 1688 he was numbered among the 7 bishops tried under

sea.' Such well-organised and planned strongholds could only have been built under powerful patronage, and it is suggested that King Sweyn Forkbeard was responsible for T. and that units of his troops stationed there may have been among those which invaded Britain. The camp consists of a circular inner ward, with outer defences and other attributes, surrounded by a massive bank of earth strengthened with timber, within which is a regularly laid-out plan of streets, and of barrack buildings now revealed by the holes and slots of their decayed beams in the underlying clay soil. There were 4 main blocks of buildings, each consisting of 4 rectangular boat-shaped houses which would accommodate about 1500 men. One house has been rebuilt, the lines of the others being permanently marked, and the site has been given by the owner to the National Museum at Copenhagen. There is good evidence of Rom.



National Museum, Copenhagen

TRELLEBORG: A MODEL OF THE CAMP BY P. WILLADEN

James II for refusing to conform to the Declaration of Indulgence, but was acquitted. He is believed by many to be the hero of R. S. Hawker's ballad, *And Shall Trelawny Die?* Others, however, maintain that this referred to T.'s grandfather, Sir John (a staunch royalist imprisoned by the House of Commons in 1628), and was merely revived in Sir Jonathan's favour.

Trelew (Trelew), *tn* of Patagonia, Argentina, on the Belgrano Railway about 40 m. from Puerto Madryn (q.v.) and, like the latter *tn*, founded by Welsh settlers in 1881. It is commercially the chief *tn* of Patagonia, with its own airport, and the centre of a large sheep-farming area. Pop. (Welsh, Italians, and Argentines) 11,000.

Trelleborg, on the is. of W. Zealand, Denmark, is the site of a large and imposing Viking stronghold occupied between AD 950 and 1050, which was skillfully excavated with the most modern archaeological technique in 1932-42. A similar but larger fortress is known at Aggersbord on the Lim Fjord, and in both 'aspiring youth was trained under discipline and fixed regulations for the craft of war and for the grim voyage over the

heritage in the street-plan of the fort and in the fact that the rigid unit of measurement is a Rom. ft, but whether it came by way of Byzantium or the military works of the Slavonic peoples is not yet decided. See P. Nerlund 'Trelleborg' (*Nordiske Fortidsminder*), 1948, with good summary in English.

Trematodes, class of flat worms, with an oval non-segmented body. Many of them are parasitic, and among the most important are *Distomum hepaticum* and *D. lanceolatum*, which cause liver fluke (q.v.) in sheep and other ungulates, also *Amplostomum Collinsii* and *Gastrodiscus Aegyptiacus*, both of which infest the intestines of horses, and *Bilharzia crassa*, a blood parasite of cattle and of man in the tropics; this and other species lay their eggs in the bladder and rectum, and are the cause of *bilharziasis* (q.v.).

Tremolite, see AMPHIBOLE.

Trench, Frederic Herbert (1865-1923), poet and playwright, *b.* Avoncote, co. Cork, great-nephew of Richard Chenevix T. (q.v.). Educ. at Haileybury and Keble College, Oxford, in 1889 he was elected a Fellow of All Souls. From 1900 to 1909 he was senior examiner at the Board of Education, and then for 2

years was a director of the Haymarket Theatre. His books of verse include *Deirdre Wed.*, 1900, *New Poems*, 1907, *Lyrics and Narrative Poems*, 1911, *Ode from Italy in Time of War*, 1915, and *Poems, with Fables in Prose*, 1918. *Napoleon*, 1918, is a 4-act play, and he was working on another, *Talleyrand*, when he died in Italy. See A. Chevalley, *Herbert Trench: sa vie et ses œuvres*, 1925.

Trench, Richard Chenevix (1807-1886), prelate and philologist, b. Dublin. Educ. at Harrow and Cambridge, he took orders and became in 1847 prof. of theology in King's College, London, in 1856 dean of Westminster, and in 1864 Archbishop of Dublin. In theology his best-known works were his *Hulsean Lectures*, 1845, *Notes on the Parables*, 1841, and *Notes on the Miracles*, 1846, while his *Sacred Latin Poetry* is a valuable collection of medieval hymns. Philological works are *The Study of Words*, 1851, and *English Past and Present*, 1855. He also wrote many poems. See life by J. Silvester, 1891.

Trench, or Trench Warfare, in military engineering, a T. is an excavation in the earth used to protect infantry from the enemy's fire. T. W. was an almost entirely new method of fighting when adopted early in 1915 in the First World War, though its principles had been applied as early as the Russo-Japanese war of 1904-5. Old principles were largely discarded when the war of movement or *guerre de manœuvre* on the W. front ceased and the lines of the opposed forces became stabilised in trenches extending from Alsace to the Belgian coast. In the course of the 4 years of T. W., T.s became most elaborate examples of field fortifications. There were advance of fire T.s so sited that the occupants could fire on the enemy; support T.s farther to the rear to give cover for troops sufficiently near the front line to be able to reinforce it at need, and sometimes arranged so that the occupants could fire over the front line T.s; and communication T.s which provided a zig-zag road for troops to pass between the front line and support T.s and positions farther to the rear without being exposed to enfilade fire. Among weapons specially developed for T. warfare were a cutter for excavation and a mortar for throwing bombs against hostile machine-gun emplacements and sniper's posts or into the enemy's T.s (see MORTAR). A disease known as T. fever developed among soldiers serving in the T.s. A feature of this T. W. was that advances were usually small and extremely costly in casualties. T. W. played little part in the Second World War.

Trenchard, Hugh Montague, first Viscount (1873-1956), soldier, airman, and administrator, entered the Army in 1893 and served with distinction in the S. African War (1899-1902). In 1912 he obtained his air pilot's certificate and in 1914, in the First World War, was commandant of the military wing of the Royal Flying Corps. In 1915 he was appointed chief of the air staff. Colonel in 1915,

and maj.-gen. in 1916, in 1918 he was appointed to command the independent Air Force in France. In 1919 he was again chief of the air staff, which position he held for 10 years, becoming air chief marshal, 1919. He was created baronet in 1919, and G.C.B., 1924, and was raised to the peerage in 1930, becoming Viscount in 1936. From 1931 until 1935 he held the post of Commissioner of the Metropolitan Police Force; the Hendon police college was one of the reforms instituted by him.

Trenčín (Magyar Trenosén), Czechoslovak town in the region of Bratislava (q.v.), on the Váh. It was once cap. of a Hungarian co. Pop. 13,600.

Trenck, Friedrich von der, Baron (1726-94), Prussian soldier, b. Königsberg; when only 16 years of age became a cadet in the bodyguard of Frederick the Great. He was soon promoted, and distinguished himself in a campaign against Austria, but his intrigue with Princess Amelia of Prussia led to his imprisonment in the citadel of Glatz in 1745. He escaped, however, and entered Russian service. In 1745 he was again arrested and imprisoned in the fortress of Magdeburg, and was only set at liberty in 1763. T. was ultimately guillotined in Paris.

Trenčsén, see TRENCÍN.

Trendelenburg, Friedrich (1844-1924), Ger. surgeon, b. at Berlin, studied medicine there and was M.D., 1866. He was professor of surgery at Rostock (1875-82), at Bonn (1882-95), and at Leipzig (1895-1911). He devised an operation for excision of varicose veins (1890), invented a cannula (tube for insertion into the body) (1873), and was first to attempt the surgical removal of pulmonary embolism (1908), an operation first successfully performed in 1912. He is also remembered for *T.'s position* (1890), with the patient lying face upwards and the pelvis raised at an angle of 45 degrees, useful, e.g. for gynaecological operations, since the intestines are kept out of the field of operation.

Trendelenburg, Friedrich Adolf (1802-72), Ger. philosopher, b. Eutin, near Lübeck; educ. at Kiel, Leipzig, and Berlin univ., at which last he was prof. from 1833 until his death. His prin. work, *Naturrecht auf die Grundle der Ethik*, was pub. in 1860; but he also made valuable contributions to Aristotelian studies with *Geschichte der Kategorienlehre* (3rd ed.), 1876, and *Elementa Logicae Aristoteleae* (9th ed.), 1892. See life by H. Bonitz, 1872.

Trengganu, state of the Federation of Malaya (q.v.), formerly federated Malay States under Brit. protection. It lies on the E. coast of the Malay Peninsula, and is bounded by Kelantan (q.v.) on the N. and NW., by Pahang on the S. and SW., and by the China Sea on the E. Its inland boundaries follow the watersheds of its larger rivs., the Beut, Trengganu, Dungun, and Kemaman. The W. and inland half is mountainous and almost uninhabited. The pop. is concentrated on the rivs. and along the coast-line. The highest peak is Gunung Lawit (4985 ft).

The administrative centres are Besut in the N., Kuala Trengganu in the centre, and Kemaman in the S. The seat of gov. is at Kuala Trengganu, which is also the residence of the Sultan. Nearly all the characteristic commodities of Malaya are produced in T.

The early hist. of T. is obscure. A Chinese Buddhist monk and traveller, Chau Ju Kua, mentions it among places subject to the old kingdom of Palembang. A Javanese work, the *Nagarakretagama*, written 1365, speaks of both T. and Dungun as tributary to Majapahit (see *MALAYA, History*). The discovery in 1923 of a Malay stone at Kuala Brang, 20 m. from Kuala Trengganu, with a remarkable mixed Malay-Arab inscription, dated 702 AH (AD 1303) on the subject of the Islamic law of sexual offences, points to the existence of a Mohammedan kingdom in the upper Trengganu R. a century before the recorded date of the Mohammedan conversion of Malacca. This stone is now in the Raffles Museum, Singapore. The ruling house of T. is descended from the ancestor of the present rulers of Johore and Pahang. In 1776 Sultan Mansur (1730-92) sent the *bunga mas* or golden flower to the King of Siam, and this practice was continued until, by a treaty in 1909, the Siamese Gov. transferred to Great Britain all rights of suzerainty over the States of Kelantan, Kedah, Trengganu, etc. A treaty in 1910 between Great Britain and T. provided that T. should receive a Brit. officer to reside in T. to be an Agent with functions similar to those of a consular officer. In 1919 this provision was cancelled and a Brit. Adviser substituted, whose advice had to be sought and acted on in all matters affecting the general administration of the country and all questions other than those touching the Mohammedan religion. Area 5050 sq. m.; pop. 263,000.

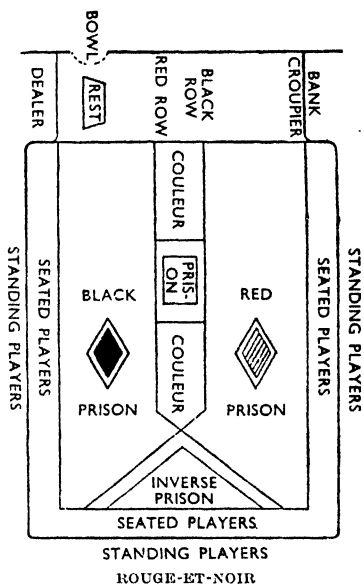
Trent, Jesse Boot, first Baron (1850-1931), industrialist, b. Nottingham, founder of Boot's Pure Drug Company. As a boy he worked in a herbalist's shop owned by his mother, but after about 14 years he had a shop of his own. In 1883 he formed the company of J. Boot and Co., Ltd., which was among the first 'chain stores' in the country. Five years later the company became Boot's Pure Drug Co. and by 1896 owned 60 shops in 30 tns. B. was a munificent patron of education, and among his donations was the sum of £500,000 to build Univ. College, Nottingham (see also NOTTINGHAM UNIVERSITY). He was an active Liberal. Knighted in 1909, he was created a peer in 1929.

Trent, see TRENTO.

Trent, third most important riv. of England, rising in Staffordshire and flowing through the cos. of Derby, Leicester, Nottingham, and Lincoln, eventually joining the Ouse to form the Humber. It is about 170 m. long, and is connected with other rivs., and with the Birmingham and Lancashire dists. by the Trent and Mersey and Grand Union canals.

Trent, Council of, the 19th oecumenical council of the Church. It was convoked by Pope Paul III in 1545 to restore peace to the Church, then distracted by the teaching of Luther and other reformers. It sat till 1563 and passed a number of decrees defining doctrines questioned by the Protestants and reforming abuses. The Council was of considerable importance as laying down the main lines of Rom. Catholic development in post-Reformation times. Its decrees were confirmed by Pope Pius IV in 1564.

Trente-et-Quarante, or **Rouge-et-Noir**, is played with 6 packs of cards on a table (see diagram) marked out for the game. The cards having been shuffled, one of the players cuts, and so many cards are dealt out face upwards in a row, until the sum of the pips exceeds 30 in number.



The court cards and tens count 10 each, and the aces 1. A second row is then dealt out below the first one, until the pips in this row also exceed 30. The top row (see diagram) is called 'black' and the second 'red,' the winning row being that which contains the fewer pips. A total of 31 would be the best possible, and 40 the worst possible 'point.' Players can also put their stakes on couleur or inverse. The 4 even chances, black, red, couleur, and inverse, are played and paid in precisely the same way as the even chances in roulette. The chances couleur and inverse are decided by the colour of the first card turned up. If the colour corresponds with the colour of the row containing the fewer pips, couleur wins;

if with the other row, inverse wins. Playing may be *à cheval*, i.e. on combinations of the above, either on red and couleur or black and couleur, red and inverse or black and inverse. Staking *à cheval*, i.e. on combinations of the above, either on red and couleur or black and couleur is the same as staking on the line between red and impair, or noir and pair at roulette. If both chances win, the bank pays even money; but if both lose the stake is lost. If one wins and the other loses, the bet is 'off,' and the player may either take his stake up or leave it for the next coup. Where both rows total 31, the result, which is called a *refait*, is analogous to that in roulette when zero appears, i.e. the stakes are put *en prison*, and after the ensuing deal the stakes on the winning chances are withdrawn from prison and the others lost. But instead of being put in prison in the first instance, the player may, at his option, as at roulette, halve his stake with the bank. If, however, the player chooses to go into prison, he has the option to choose the prison before the next deal; and if he selects the right coloured prison (see diagram), e.g. if he chooses red, and the red chance wins the next coup, he can do as he likes with his stake. If, on the other hand, a second *refait* appears, he must win twice in succession before he can withdraw his stake. If the 2 rows come out at the same total of any number over 31, the coup is null and void, and the stakes may be removed from the table or not, as the players choose. A *refait* is said to occur once in 38 deals on the average, which, if true, would give the bank a slightly less advantage than at roulette, where it is 1 in 37. Again, the odds against black and red both totalling 31 are 81 to 1. The punter or 'player,' however, is at liberty to insure against the *refait* by paying 1 per cent on his stake; but a minimum premium payment is set by the bank. The effect of insuring is that, if the *refait* appears, the punter's stake does not go into prison, and he is at liberty to remove it. See H. Jacobson, *Roulette, Trente-et-quarante and Boule*, 1928.

Trentino-Alto Adige (formerly *Venezia Tridentina*), region (*compartimento*) of N. Italy, comprising the provs. of Trento and Bolzano (qq.v.). It is bounded N. by Austria, W. by Lombardy, and S. and E. by Veneto (qq.v.). Before 1919 the dist. belonged to the Austrian Tirol (q.v.), thus leaving 400,000 Italians under Austrian rule. By the treaty of St Germain-en-Laye (q.v.) it was ceded to Italy. It was the scene of prolonged fighting between the Italians and the Austrians in the First World War, particularly in 1916. The last considerable fighting here was the Austrian offensive in June 1918 (see ITALIAN FRONT, FIRST WORLD WAR CAMPAIGN ON). The chief tn is Trento, and the region has a local autonomy. Area 5250 sq. m.; pop. 750,000.

Trento: 1. Prov. of Italy, the S. part of Trentino-Alto Adige (q.v.). It is in the Alps (q.v.), with high mts and steep riv. valleys. The prov. is crossed by the road

to the Brenner Pass (q.v.), and in ancient times was the main entrance to Italy from N. Europe. The N. end of Lake Garda (q.v.) is in the S. of the prov. The prin. tns include T., Rovereto, and Levico (qq.v.). Area 2450 sq. m.; pop. 401,000.

2. Or **Trent** (Ger. *Trient*; anct *Tridentum*), It. city, cap. of the prov. of T., and also chief tn of Trentino-Alto Adige. It occupies a strategic position on the Brenner Pass (q.v.) route and the Adige (q.v.), 290 m. N. by W. of Rome (q.v.). It is of pre-Rom. origin, and became part of the Ger. Empire in the time of Otto I (q.v.). It remained Ger., ruled by prince-bishops, until 1801, in which year it was taken by the French. It was ceded to Austria in 1803, and passed to Italy after the First World War. During the Second World War it was again for a time (1943-5) re-incorporated in Germany, but was returned to Italy at the end of the war. The tn has an archiepiscopal cathedral (Lombard-Romanesque and Gothic), old walls, and a castle (now a museum). Most of the sessions of the famous Council of T. (q.v.) took place in the Renaissance church of S. Maria Maggiore. The prin. manufs. are silk, pottery, and wine. Pop. (tn) 40,500; (com.) 65,500.

Trenton, city (pop. 128,000), cap. of Mercer co. and of New Jersey, U.S.A., on Delaware R. and at head of navigation, c. 30 m. above Camden. It manufs. wire, ropes, cable, structural steel, pottery, rubber goods, aeroplane and auto equipment, steam turbines, hardware, cigars, porcelain, clothing, paper, linoleum, asbestos fabrics, and home appliances. It has a state teachers' college (1855), Rider College, a junior college, a state prison, and other institutions. The Revolutionary Battle of Trenton is commemorated by a 155-ft granite monument topped by the figure of Washington. Washington's Delaware R. crossing point, c. 8 m. N., is a state park. Points of interest are the state capitol, with golden dome; the capitol annex with state library and museum; the First World War memorial building; the barracks built in 1758 (restored); Bloomsbury Court (1719); and Bow Hill, home of Annette Savage, mistress of Joseph Bonaparte.

Trepang, see *BÊCHE-DE-MER*.

Trepanning (Gk *trupanon*, bore), operation of boring a circular hole, usually in the cranium to permit access to the brain. The instrument used is a trepan (trephine), and resembles a carpenter's bit provided with a handle. The discovery of prehistoric skulls bearing circular scars with signs of healing shows that T. is an operation of great antiquity, being performed presumably for the purpose of releasing imaginary evil spirits and devils. Nowadays it is carried out in operations on the brain, and also to relieve excessive intracranial pressure resulting, for instance, from a fracture of the skull. T. is also performed with miniature trephines on the eyeball (see under GLAUCOMA). See D. Guthrie, *History of Medicine*, 1945.

Tréport, Le, Fr. port and seaside resort on the English Channel, in the dept. of Seine-Inférieure. It has a striking 16th-cent. church and the ruins of an 11th-cent. abbey. It is separated by the R. Breüle from Mers-le-Bains, which is in the dept. of Somme. Fishing is carried on, and a coasting-trade, and there is a casino. Pop. 5100.

Tres Arroyos, tn of Argentina, in the prov. of Buenos Aires, 110 m. E. of Bahía Blanca and 270 m. SW. of Buenos Aires on the Roca Railway. It is the centre of an agric. and live-stock dist. Pop. 32,000.

Tresco, one of the Scilly is. and the second in size; lies 1 m. NW. of St Mary's. The area is about 700 ac., and it contains the ruins of a Benedictine abbey. Pop. 200.

Trespass, in a wide sense, denotes any transgression to persons or property. In Eng. law T. to property is the most common type. An unauthorised entry on to another's land is technically a T. and, despite the common warnings that 'trespassers will be prosecuted,' a prosecution is possible only if any damage is done. The owner of land or a house can sue civilly for T. anyone unlawfully retaining possession, e.g. a squatter or a former tenant who has been given a valid notice to quit which has expired. T. of goods is an act which infringes the owner's possession. T. to the person is the unlawful application of force to the body of another; examples of this form of T. are assault, battery, and false imprisonment (qq.v.).

Tret, allowance of 4 lb. in 104 lb. (i.e. $\frac{1}{2}$ %) on goods sold by weight after deduction for tare.

Trevelyan, George Macaulay (1876-), historian, third son of Sir G. O. Trevelyan. Educ. at Harrow and Trinity College, Cambridge, during the First World War he was Commandant of the 1st Brit. Ambulance Unit in Italy. He became Chevalier of the Order of St Maurice and St Lazarus (Italy), 1920; C.B.E., 1920; and O.M., 1930. From 1927 he was Regius Professor of Modern History at Cambridge Univ. until 1940 when he became Master of Trinity College (until 1951). Pubs. include: *England in the Age of Wycliff*, 1899, *England under the Stuarts*, 1904, *The Life of J. Bright*, 1913, *Lord Grey of the Reform Bill*, 1920, *British History in the Nineteenth Century*, 1922, *History of England*, 1926, *England under Queen Anne*, 1930, *The Peace and the Protestant Succession*, 1934, *Sir George Trevelyan: A Memoir*, 1932, *Grey of Fallodon*, 1937, *The English Revolution, 1688* (Home University Library), 1938, *English Social History: A Survey of Six Centuries*, 1944 (illustrated ed.), 1949, *The Seven Years of William IV*, 1952, and *An Autobiography and Other Essays*, 1949. He holds hon. doctorates of many Brit. and Amer. univs. Chancellor of Durham Univ., 1949. T.'s pubs. combine great scholarship with readability: his *English Social History* was an outstanding best-seller.

Trevelyan, Sir George Otto (1838-1928), statesman and author, b. Rothley Temple,

Leicestershire, a nephew of Lord Macaulay and educ. at Harrow and Trinity College, Cambridge. In 1865 he entered Parliament as Liberal for Tynemouth. T. was successively Civil Lord of the Admiralty, 1869-70; secretary of the Admiralty, 1880-2; chief secretary for Ireland, 1882-4; chancellor of the Duchy of Lancaster and member of the cabinet, 1884-5; secretary for Scotland, 1886 and 1892-5. In 1897 he retired from public life. He pub. a number of works dealing with historical and general subjects, including his famous *Life and Letters of Lord Macaulay*, 1876, and *Early History of Charles James Fox*, 1880. See memoir by G. M. Trevelyan, 1932.

Trevelyan, Robert Calverley (1872-1951), poet and playwright, son of Sir George T. Educ. at Harrow and Trinity College, Cambridge, he made many trans. from Gk authors and from the works of Leopardi. Vols. of his own verse include *Mallow and Asphodel*, 1898, *Polyphemus*, 1901, *The Bride of Dionysus*, 1912, *The Death of Man*, 1919, *Poems and Fables*, 1925, *Timeless Numbers*, 1932, *Beelzebub*, 1935, and *From the Skifolds*, 1947. Among his plays are *The Birth of Parsival*, 1905, *Meleager*, 1927, and *Chetron*, 1928. In prose he pub. *Thamyris, or the Future of Poetry*, 1925, and *Windfalls*, 1944, a book of essays.

Trevena, see TINTAGEL.

Treves, Sir Frederick (1853-1923), surgeon and author, b. Dorchester, where, and at Merchant Taylors' School in London, he was educ. M.R.C.S. in 1875, he practised for a time in Derbyshire, returned to hospital practice in London, and was Hunterian prof. of anatomy and Wilson prof. of pathology at the Royal College of Surgeons, 1881-6, and consulting surgeon to the forces in S. Africa, 1900. Surgeon to Edward VII from 1901, he performed the operation on that king for appendicitis in 1902. He became K.C.V.O., 1901, and baronet, 1902. He returned from retirement during the First World War, and was president of the H.Q. medical board at the War Office. From 1920 he lived in France. His works include: *System of Surgery*, 1895, *Manual of Operative Surgery*, 1891, *German-English Dictionary of Medical Terms* (with H. Lang), 1890, *Highways and Byways in Dorset*, 1906, *Cradle of the Deep* (on the W. Indies), 1908, *Through the Desolate Land*, 1912, *The Riviera of the Corniche Road*, 1921, and *The Elephant Man and other Reminiscences*, 1923. See *Dictionary of National Biography*.

Treves, see TRIER.

Trevisa, John de (c. 1322-1402), priest, b. Cornwall. He was at Exeter College, Oxford (1362-5), and fellow of Queen's (1369), and from 1362 he held the vicarage of Berkeley, where he is buried. He trans. Ranulf Higden's *Polychronicon* (q.v.). The trans. was completed in 1367, printed in 1482 by Caxton, and long remained a standard work. He also trans. Glanville's *De Proprietatibus Rerum* and other Lat. works.

Treviso: 1. Prov. of Italy, in E. Veneto (q.v.). It is mainly part of the great N.

plain of Italy, but in the N. it has ridges of the Alps (q.v.). It is crossed NW.-SE. by the Piave; other rivs. are the Sile, the Piavesella, and the Musone. The prov. is mainly agric. Among the prin. tns are T., Montebelluna, Conegliano, and Vittorio Veneto (qq.v.). During the First World War it was the scene of severe fighting (see PIAVE, BATTLE OF; VITTORIO VENETO, BATTLE OF). Area 975 sq. m., pop. 613,000.

2. (Anct Tarvisium), It. tn, cap. of the prov. of T., at the junction of the Sile and the Piavesella, 16 m. N. by W. of Venice (q.v.). It is a picturesque tn, with canals, curious houses, winding alleys, and arcades. There is a 13th-cent. palace (restored after bomb damage), and a cathedral (12th-19th cents.) containing an altar piece by Titian (q.v.). The tn suffered very heavy damage in both World Wars. There is a large trade in agric. produce. Pop. 67,000.

Trevithick, Richard (1771-1833), inventor of locomotives, b. Illogan, Cornwall, the only son of Richard T., mine-manager and friend of Wesley. He attended Camborne School, but was frequently truant; he was a notable wrestler and weight-lifter. About 1797 T. made a steam-engine for Herland mine, and in 1800 made a double-acting high-pressure engine for Cook's Kitchen mine. Having experimented with model locomotives from 1796, he completed by the end of 1801 the first steam carriage that ever drew passengers; another, in 1803, worked for a short time in London. In Wales, Feb. 1804, he put the first practical rail locomotive into use; it had a fly-wheel, and did not work long. T. was the first to turn steam-exhaust into the chimney and to rely on friction of smooth rails and wheels. In 1809 he failed in an attempt to make a tunnel under the Thames. He made a steam threshing-machine, 1811. In 1816 T. went to Peru, where his engines were being installed in the mines, and lost all his property in the insurrection of the twenties. He prospected for an inter-oceanic railroad in Costa Rica. T. took out his last patent, 1832, for superheated steam; but he had numerous unpatented projects, including a stern driving propeller. He d. in Dartford penniless. See lives by his son, Francis, 1872, and H. W. Dickinson and A. Titley, 1934.

Trévoux, Fr. tn in the dept of Ain, on the Saône, the anct cap. of Dombes (q.v.). It has wire and silk making. Pop. 3000.

Triad: 1. In mythology, a group of 3 associated deities. In Brahmanism the Hindu T. consists of Brahma, Vishnu, and Siva (see also TRIMURTI), who mark the second great development of Hinduism, Brahma not figuring at all in the Vedic hymns, Vishnu there being only the god of the shining firmament, while Siva was evolved from the Vedic Indra, god of storms. The Sumerians had a T. (Anna, Enlil, and Enki), originals of the Babylonian T., Anu, lord of heaven, Bel, lord of earth, and Ea, lord of the abyss, dividing the universe between them, cf.

Zeus, Poseidon, and Hades among the Greeks. In anct Egypt, from the time of the Hyksos, a marked tendency to identify every god with the Sun, Ra, and add his name to theirs marks latent belief in monotheism, but in priestly circles it helped to promote a pantheistic creed, with the formation of triads and enneads (of 9 deities, a later attempt at systematic grouping). In Egyptian religion the T. in any dist. usually consisted of a goddess, a god, and their son. As the gods were mortal the son was destined to take his father's place and was his exact counterpart—a symbolic way, perhaps, of expressing the idea of eternity. In Chinese religion there are the Three Holy Ones, instructors and benefactors of mankind, whose immense images are, or were, worshipped in every Taoist temple (see LAO-TSE). In Scandinavian religion Thor, Odin, and Loke were always warring against the giants, who represented the rude forces of nature.

2. A Welsh form of literary composition depending on arrangement in groups of 3. The Welsh T.s are an arrangement of similar subjects, things, or events in series of 3 under some general title suggesting that they were more or less connected. Among the best-known are the T.s of Horses, which are included in the 12th-cent. Black Book of Carmarthen; the T.s of Arthur and his warriors, believed to be of the 13th cent.; the T.s of the Island of Britain, in the Red Book of Hergest (a 14th-cent. MS. in the possession of Jesus College, Oxford); and the later T.s of *Dyfnwal Moelmud*, a legendary king of Britain. The Third Series of T.s in the *Mynyrion Archaeology of Wales* are the forgeries of the 18th-cent. Iolo Morganwg (Edward Williams).

3. In the pseudonymous writings of Dionysius the Areopagite (q.v.) the word is used of the celestial and eccles. hierarchies. Thus, in the celestial are the 3 T.s of seraphim, cherubim, and thrones; dominations, virtues and powers; principalities, archangels, and angels. In the eccles. or earthly hierarchy the first T. is formed by baptism, chrism (i.e. confirmation), and communion; the second by bishops, priests, and deacons; the third by monks, 'initiated' (i.e. ordinary laity), and catechumens.

4. In chemistry T. is the name given to those elements which can directly unite with or replace 3 atoms of hydrogen, chlorine, or other monatomic element. The T.s are boron, gold, indium, and thallium.

5. In music T. denotes a common chord or harmony, because it is formed of 3 radical sounds: a fundamental note or bass, its third, and its fifth. T.s are said to be major or minor, augmented or diminished.

Trial. T.s of civil actions in England respecting common law matter (i.e. generally speaking, breaches of contract and torts, see TORT) if tried in the High Court may be either before a judge and jury or by consent before a judge alone. Actions in the commercial list are tried before a judge alone (see COMMERCIAL

COURT). Actions involving accounts are assigned for T. before official referees. Actions touching matters of equity (q.v.) are tried exclusively before judges only; similarly in the case of bankruptcy matters. Admiralty causes are tried before a judge of the Probate, Divorce, and Admiralty Division with or without the aid of nautical assessors (see EVIDENCE; TRINITY HOUSE). Divorce petitions, if undefended, are disposed of by a judge alone; if defended may or may not be tried before a jury at the discretion of the court or a judge. Notice of T. may be given by the plaintiff or other party in the position of plaintiff. Such notice may be given with the plaintiff's reply whether the latter closes the pleadings or not, or (in other than Admiralty actions), where no order for a reply has been made, on the expiration of 4 days after the defence or last of the defences shall have been delivered, or at any time after the issues of fact are ready for T. The notice of T. must state the place and the day which the plaintiff proposes for the T. and must be given at least 10 days before that day, unless the defendant has consented, or has been ordered to accept short notice of T., which is usually 4 days. In every action in every division of the High Court the place of T. is fixed by a master, and in fixing the place regard will be had to the convenience of the parties and their witnesses. The plaintiff, however, has *prima facie* the right to select the place of T., and the defendant must show a distinct preponderance of convenience to oust him of this right. But the defendant will be entitled to have the venue changed if he can show that there is no probability of a fair T. in the place the plaintiff has selected. A plaintiff who proposes to try at some place other than Middx must name the place in his original Statement of Claim. If the plaintiff does not within 6 weeks after the time when he first becomes entitled to give notice of T. (or within such extended time as the court or a judge may allow) give notice of T., the defendant may himself give notice of T. or apply to the court or a judge to dismiss the action for want of prosecution. If the action be for trial at assizes, the notice must be entered either at the district registry of the assize in or with the associate of the circuit. The rights of the parties to a jury in civil cases have been limited by the Administration of Justice (Miscellaneous Provisions) Act, 1933. It is now a matter for the discretion of the master in most actions in the Queen's Bench Div. whether there shall be T. by jury or not. (*Hope v. G. W. Rly.*, 1937). The power to order a jury is used sparingly; but if either party applies not later than 4 days after notice of T. has been given, or, if no notice of T. is required, 4 days after the action has been set down for T., and satisfies the master either that a charge of fraud has been made against him or a claim in respect of libel, slander, malicious prosecution, false imprisonment, seduction, or breach of promise is in issue, he still has an absolute right to a jury, unless the T.

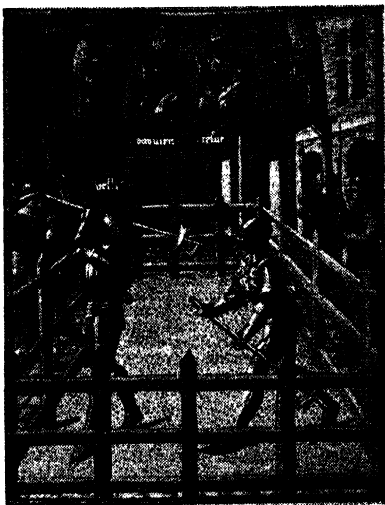
will require prolonged examination of documents or accounts or any scientific or local investigation which cannot be conveniently made with a jury—in such cases, even though the master has ordered T. by jury, the judge in charge of the list may order the case to be transferred to the non-jury list whether the parties consent or not (*Mayhead v. The Hydraulic Hotel Co.*, 1931). A T. will not be held with a jury in the Chancery Div., but if the issues are such that one of the parties is entitled and insists on a jury, as it seems that he can, the action will be transferred to the Queen's Bench Div. Where a jury is ordered either party may insist on a special jury (see JURY). Co. court actions may be tried before a judge and jury of 8 men, or before a judge alone (see COUNTRY COURT; INFERIOR COURT). The right to begin at a trial depends upon the mode of raising the issues on the pleadings so far as actions for debt or liquidated (i.e. certain or fixed) damages are concerned. The plaintiff will ordinarily begin in order to substantiate his affirmative pleas, but the defendant may gain the right if his defence contains none but affirmative pleas. In actions for unliquidated actions (which, generally speaking, include all those in which parties can demand a jury as of right) the plaintiff is always entitled to begin irrespective of whether the burden of proof lies upon the defendant. The right is a formidable one in a jury action, as the 'last word' (unless the other party calls no witnesses) rests with him who begins. It is a right of no great value where the judge sits alone. For the rules of evidence at a T. and the difference between examination-in-chief and cross-examination, see EVIDENCE; EXAMINATION; and LEADING QUESTION. An application for a new trial may be made on several grounds: e.g. misdirection by judge, misreception of evidence, misbehaviour of the jury, excessive damages. Such application is made by notice of motion to the Court of Appeal within 8 days after the T. Criminal T.s in England at assizes (including the Central Criminal Court) and quarter sessions are held before a judge and jury. Petty offences are tried before a bench of justices of the peace or a stipendiary magistrate. See W. B. Odgers, *Principles of Pleading and Practice* (15th ed.), 1955; *Annual Practice of the Supreme Court* ('The White Book').

Trial by Combat, or Wager of Battle. This mode of trial, which was introduced into England by the Conqueror, was resorted to in civil actions, 'appeals' of felony, and cases before the Court of Chivalry. In civil cases, to avoid the possible loss of one of the parties, the duel was fought by hired champions, but in military cases the parties themselves fought until one was slain or gave in (when he was put to death unless the king intervened). Where the blood relations of a murdered person 'appealed' (meaning in this sense accused) the supposed murderer, the latter, where the accuser was not a woman, child, priest, or infirm person, could claim T. by C. with his accuser. The accused was hanged if

vanquished, but if he killed his accuser or prolonged the fight from sunrise till dark he was acquitted. From the 12th cent. onwards, T. by C. was repeatedly condemned by the Church, notably by the Lateran Council in 1215, and gradually fell into disuse as the belief of the medieval lawyer in the rationality of law gained popular hold. Owing to the principle of Eng. jurisprudence that no law can be abrogated by mere desuetude, one

Czechoslovakia and the Kingdom of the Serbs, Croats, and Slovenes was recognised. The independence of Hungary was made inalienable otherwise than with the consent of the League of Nations. Hungary renounced all claim over territory outside Hungary which formerly belonged to Austria-Hungary.

Triassic System, in geology, is the first of the 3 rock systems of the Mesozoic period. It constituted the upper half of the original New Red Sandstone before the elimination of the lower half as the Permian (q.v.). The system shows 3 distinct lithological types, viz.: (1) the marine facies of the Alpine Trias; (2) the semi-marine and semi-continental facies of the Ger. Trias; and (3) the continental facies of Great Britain, S. Africa, etc. The 3 members of the original Ger. T. system were named Bunter or variegated sandstones, Muschelkalk or shelly limestone, and the Keuper or marly beds. In Britain, only 2 members of the series are developed, the Bunter and the Keuper, and the system attains its greatest development in Cheshire and Warwick (about 2000 ft thick). The Bunter or Lower Trias is made up of the Upper and Lower variegated sandstones with the intermediate pebble beds, and the Keuper or Upper Trias consists of the Keuper marls and waterstones. The Bunter and Keuper are practically barren of fossils, but the latter affords beds of gypsum and rock salt as well as building stone. A large part of Germany is occupied by Triassic rocks, the Bunter affording beds of dolomite and the Keuper local seams of coal (Lettenkohl) and beds of gypsum. The middle member of the Ger. Trias (the Muschelkalk) is very rich in fossils. The Brit. and Ger. Trias were probably laid down in irregular basins, and the Muschelkalk of Germany must have been formed when the waters of the Ger. basin were in communication with the open sea. The grand development of the marine facies of the Triassic in the E. Alps consists of thick bedded limestones, dolomites, and calcareous shales. The system here is generally divided into 4 sub-divisions, viz. the Alpine Bunter, the Alpine Muschelkalk, the Norian, and the Carinthian, none of which can be individually correlated with the Ger. types, although the range in time is equivalent. The transition beds between the Trias and the Lias (the Alpine Rhaetic beds) can be paralleled with the Rhaetic or Penarth beds of Britain. These beds are very fossiliferous, and are sometimes designated 'Avicula Contorta' beds. The Alpine or marine type of Trias recurs in the Balkans, Apennines, Peru, Himalaya, Alaska, and Japan. The continental type of Triassic occurs in S. India, S. Africa, and in parts of N. America. The life of Triassic time was rich and varied. The animals include fishes (Dipnoids), amphibia, and all classes of reptiles. Pterosaurs, conifers, and cycads represented the plant life of the time, and the invertebrata embrace all classes. Lamellibranchs, gasteropods, cephalopods, and graptolites were most abundant, and the Muschelkalk is rich in their remains.



British Museum

TRIAL BY COMBAT (15TH CENT.)

The guilty man is indicated by a black bird (symbolising evil) hovering over his visor.

Abraham Thornton, accused of murder in 1817, revived this archaism of chivalry and challenged his accuser to T. by C. The 'appellant' declined, and Thornton had perforce to be discharged. T. by C. was then hastily abolished by statute.

Triangle, percussion instrument consisting of a simple steel bar in 3-cornered form. It is struck with a short steel rod and produces a bright tinkling sound of no definite pitch.

Triangulation, see ORDNANCE SURVEY; SURVEYING AND LEVELLING.

Trianon, Treaty of, between the Allies and Hungary, signed 4 June 1920, at the Grand Trianon, a building in the park of the palace of Versailles, France. The principal effect of the treaty was to reduce considerably Hungary's territory. The N. portion went to Czechoslovakia and the S. to Yugoslavia, whilst Hungary retained the middle portion. The Covenant of the League of Nations forms part of this treaty as in the case of the treaty of Versailles (q.v.). The independence of

Tribe, group of barbarous clans under recognised chiefs. In Rom. hist. the word denotes each of the political divs. of Romans, originally 3 in number, probably representing clans, and ultimately numbering 35 (see *GENS*); also any similar div. whether of natural or political origin, e.g. the Israelites were divided into 12 T.s, descendants of the sons of Jacob (the 10 T.s were these Jewish T.s without Judah and Benjamin, and the 'lost tribes' were the 10 T.s after deportation by Shalmaneser (see *LOST TRIBES*)). There were also T.s among the anc. Greeks. The Amer. Indians are divided into T.s to-day (see *AMERICAN INDIANS*). To-day the word tribe is chiefly associated with tribal organisation in Africa, especially in the tropical African dependencies, in the study of which the researches of social anthropologists have greatly increased our knowledge. In Africa, however, a study of cultural origins is of less importance than that kind of investigation which concerns itself with existing peoples and their social institutions, its object being to assist the gov. and development of the peoples studied. Modern anthropological work of this type in Africa attempts to record the behaviour of the African tribesman in his reaction to indigenous and imported influences, and it is progressively devoting greater attention to the latter, especially in its relation to the evils of 'detrimentalisation.' The study of African reactions to European culture in such matters as marriage, inheritance, the private ownership of land (see *LAND TENURE, PRIMITIVE OR COLONIAL*), and the sanctions for law and order are among the most important aspects of social anthropology in Africa to-day. See also *AFRICA, Social Anthropology*; and under tribal names BANTU, HOTTENTOT, KIKUYU, MASAI. See also Lord Hailey, *An African Survey*, 1957; A. Phillips, *Survey of African Marriage and Family Life*, 1953.

Tribonian (d. 545), Byzantine jurist, b. Paphlagonia. He was president of the commission which drew up the *Pandects* and *Code of Justinian* (see *ROMAN LAW*).

Tribromomethane, see *BROMOFORM*.

Tribune (Lat. *tribunus*), name given to officers of various descriptions in the constitution of anc. Rome. Of these the most important were the *tribuni plebis*, or T.s of the commons. At first their power was small and they were only 2 in number (afterwards raised to 10). But soon they became formidable and not only preserved the rights of the people, but could summon assemblies, propose laws, stop the consultations of the senate, and even abolish its decrees by their veto. Their consent was also necessary for the confirmation of the *senatus consulta*, and if any irregularity happened in the State their power was almost absolute, for they could even imprison a consul if he acted so as to disturb the peace of Rome. Again, their persons were held sacrosanct, and to interrupt them while speaking was a punishable offence, while to strike them was a crime. Their power was under-

mined by Sulla. Pompey and Cotta, however, restored their privileges, and the office remained in full force until the time of Augustus, who accepted the office for himself in order to strengthen his own hand. It was totally abolished by Constantine. Other officials bearing the title were: (1) The *tribuni militum*, who were officers in the Rom. Army (q.v.). (2) The *tribuni cohortium praetoriarum*, who formed the emperor's bodyguard. (3) The *tribuni aerarii*, who kept the money to defray the expenses of the army. These latter were abolished by Julius Caesar, but re-established by Augustus, who added to their number. (4) The *tribuni voluntatum*, who had charge of popular entertainments.

Tribune, in architecture, either: (i) the apse of a basilican church; or (ii) a rostrum, gallery, or pulpit in a church.

Tricala, see *CALTABELLOTTA*.

Triceratops, genus of Upper Cretaceous horned dinosaurs (q.v.) belonging to the Ceratopsian group of the order Ornithischia. They were massive and quadrupedal, up to 20 ft long, with large heavy skulls extended into a neck frill at the rear, and with horns on the snout.

Trichinopoly, or **Tiruchirappalli**, tn of Madras State, India. T. figured more than once in the fighting between the British and French, the latter suffering a signal defeat here at the hands of Stringer Lawrence in 1753. There are missionary schools, and Bishop Heber, after whom a College is named, d. here in 1826. The area of Golden Rock close by is one of the biggest railway centres of S. India.

Trichinosis, or **Trichiniasis**, disease caused by the presence of the parasitic nematode *Trichina spiralis*, which is found chiefly in man, the pig, and the rat, but also in the dog, cat, rabbit, etc. The parasite finds its way into man from infected pork which has not been properly cooked. The young forms are found encysted in the muscular fibres of the pig, and when the cysts reach the intestines, the solution of the calcified capsule sets free the parasites, which grow rapidly and reproduce in enormous numbers. The young trichinae then develop and bore through the intestinal walls, ultimately reaching the muscles, where they become encysted by the secretion of lime salts. They are then quiescent, and can further develop only by reaching the intestines of another host. The acute symptoms of the disease are caused by the migration of the trichinae from the intestines. The early indications are nausea, fever, and loss of appetite; later on exhausting diarrhoea may occur, together with delirium, swollen eyelids, and tenderness and pain in the muscles. The most decisive symptom is a pronounced leucocytosis marked by eosinophilia (i.e. excess of eosinophilic white corpuscles in the blood). The treatment should include purgatives if the diagnosis is made in the early stages, otherwise this expedient is contra-indicated, as all efforts must be directed towards avoiding the debilitation of the patient. Preventive measures are important: meat should be regularly

inspected and condemned if there is infection. Those, such as sausage makers, who handle raw pork should be careful not to convey to their mouths fragments of raw meat which may be adherent to their fingers. The disease is now rare in Great Britain, but there was a recent outbreak among sausage makers in a N. tn. and on inquiry it was found that the infected persons had been in the habit of sampling the raw sausage meat. *See also* NEMATODES.

Trichloroacetaldehyde, *see* CHLORAL.

Trichloroethylene, or Trilene, *see* ANAESTHESIA.

Trichloromethane, *see* CHLOROFORM.

Tri-chromatic Printing, *see* PRINTING; PROCESS WORK.

Tricklasite, *see* FAHLUNITE.

Tricolour Spaniel, *see* SPANIEL.

Triconodonts, one of the oldest groups of fossil mammals. They lived in Jurassic times, were small in size, and had a characteristic dentition.

Tricuspid Valve, *see* HEART.

Tricycle, *see* CYCLES and CYCLING.

Tridacna gigas, *see* CLAM.

Tridentum, *see* TRENTO.

Tridolin, *see* FRIDOLIN, ST.

Triennial Acts. The object of these Acts, passed in 1641 and 1694, was to ensure the frequent meeting of Parliament. Charles I ruled for 11 years without summoning a Parliament; the result was that the Long Parliament passed the first Triennial Act, 1641, empowering the Chancellor, or in default the Peers, to issue the necessary writs, if the king failed to call a Parliament for 3 years, or in the last resort, allowing the electors to proceed to choose their representatives. The Act was repealed in 1664 by an Act which provided that Parliament must not be intermitted for more than 3 years. In 1694 William III assented to the second Triennial Act, which followed upon the declaration in the Bill of Rights that 'Parliament ought to be held frequently.' In 1716 the triennial limit was increased to 7 years. That period was reduced to 5 years by the Parliament Act, 1911.

Trient, *see* TRENTO.

Trier (Fr. *Trèves*), Ger. city in the *Land* of Rhineland-Palatinate (q.v.), on the Moselle (q.v.), near the Luxembourg border, 74 m. W. by W. of Mainz. It was founded by the Emperor Augustus c. 15 BC, and during the 3rd and 4th cents. was frequently the imperial residence. It was made the seat of a bishopric at the beginning of the 4th cent., and later the seat of an archbishopric. The Golden Bull (q.v.) of 1356 created the Archbishop of T. an Elector of the Empire, and from the Middle Ages until the end of the 18th cent. the city was the cap. of an ecclesiastical principality. In 1794 T. was taken by the French. Until 1814 it was the chief tn. of the Saar, but in that year it was annexed by Prussia. The city was again in Fr. hands from 1918 until 1940. It was severely damaged in the Second World War; it was taken by the Third Amer. Army on 2 Mar. 1945. T. has more important Rom. remains than any other place in N. Europe. The prin.

of these are a bridge; a 1st-cent. amphitheatre; a 4th-cent. imperial palace; 2 ruined baths; and a remarkable, massive gate, the *Porta Nigra*. The cathedral, rebuilt from a Rom. basilica, was extended in the 12th and 13th cents., and has baroque additions. The adjoining *Liebfrauenkirche* is one of the finest Gothic buildings in Germany. There are other medieval and baroque structures of interest, and there are sev. museums. T. is an important centre of the Moselle wine trade. Its prin. manufs. are machinery, precision instruments, textiles, tobacco, and beer. St Ambrose (q.v.) was a native of T., as was Karl Marx (q.v.). Pop. 85,000.

Trieste (Slovenian *Trst*; anct *Tergeste*), seaport situated on the Gulf of T., at the head of the Adriatic (q.v.), 70 m. ENE. of Venice (q.v.). It is the chief tn. of the Free Ter. of T. (*see below*), and is the cap. of the It. prov. of T. It was settled by the Romans in 178 BC, and became a prosperous port in the 1st cent. AD. The Romans were followed by the Ostrogoths, the Byzantines, and the Longobards, and eventually the city became part of the Empire of Charlemagne (q.v.). In the 13th and 14th cents. it was controlled by Venice, and in 1382 it submitted to Austrian suzerainty. After 1719 it was a free port. It was in Fr. hands 1797-1805, and was part of the Illyrian provs. 1809-13. During the 19th cent. it developed greatly, and was an important outlet for Austria. It became an Austrian crownland in 1867, and cap. of *Küstenland* (q.v.). For long a centre of It. irredentism, it was occupied by Italy in 1918; it was formally ceded to Italy in 1920, and became cap. of T. prov. of Venezia Giulia. During the Second World War it was heavily bombed. After the War it was in the Anglo-Amer. zone of the Free Ter. of T., and since 1954 has been in the It. zone. In the 'Memorandum of Understanding' of Oct. 1954, Italy undertook to maintain T. as a free port. The city is dominated by the hill of San Giusto (martyred at T. in AD 303, and patron of the city), on which stand the cathedral (14th cent.), the castle (16th cent., restored 1936), and Rom. remains. The old tn, with its steep and narrow streets, extends down the hill to the main square, the Piazza dell'Unità d'Italia, in which are the tn hall, and governmental and shipping offices. The new tn, on the seafloor, is spacious and well laid out. In the Piazza della Borsa there is a Rom. theatre. There are shipyards, iron- and steel-works, and oil-refineries. Machinery, textiles, foodstuffs, spirits, paper, and paints are manufactured. The city is a centre of shipping and marine insurance, and its port (with 3 basins) extends for 8 m. along the Gulf of T. Pop. (tn) 271,000; (prov.), 292,000.

The Free Territory of Trieste. At the end of the Second World War the city of T. and its environs were the subject of a dispute between Italy and Yugoslavia. The pop. of T. is largely It. in origin. T. had been in It. hands since the end of the First World War, and Italy had developed

shipyards, refineries, and irrigation works. On the other hand, T. is of more importance economically to central Europe and to Yugoslavia than it is to Italy, its immediate hinterland is largely Slovene ter., and there are Slovenian and Croatian minorities. As a compromise, under the terms of the It. Peace Treaty of 10 Feb. 1947, Italy gave up the city of T. and the Istrian peninsula (see ISTRIA); and the Free Ter. of T. was formed, comprising the city and an Adriatic coastal strip, 30 m. long and varying in width from 2 m. in the N. (at Duino) to 15 m. in the S. The Free Ter. was bounded on the landward side by Yugoslavia except in the extreme NW., where it had a 2-m.-long common frontier with Italy.

It was under the aegis of the U.N. Security Council, and its inauguration in Sept. 1947 was marked by a threat of serious disorder when Yugoslav troops appeared at a frontier post and announced their intention of marching on T.; they retired after the road had been blocked by a small Brit. force. Pending the appointment by the Security Council of a governor (whose selection could not be agreed upon), the Free Ter. was divided into 2 zones under military gov.: *Zone A*, under Anglo-Amer. administration, included the city of T., other tns (including Muggia, Miramare, Aurisina, and Duino), and some infertile rural areas of the Karst (q.v.), total area 86 sq. m., pop. (1949) 310,000; and *Zone B*, under Yugoslav administration, included the tns of Capodistria, Piran, and Cittanova (q.v.), and some fertile agric. dists., total area 199 sq. m., pop. (1949) about 70,000. In 1948 Britain, France, and the U.S.A. came to the conclusion that the problem of T. would not, after all, be solved by the estab. of the Free Ter., and these powers consequently proposed that the clauses of the It. Peace Treaty which concerned T. should be rescinded, and that a protocol should be added restoring the whole of the ter. to It. sovereignty. This remained the policy of the W. powers for some years, and T. meanwhile, stayed under military control. In 1954, however, the interested parties reached agreement on the future of the Ter. On 5 Oct. the govs. of Great Britain, the U.S.A., Italy, and Yugoslavia Initialled in London a Memorandum of Understanding terminating military gov. in both zones. On 25 Oct. the Anglo-Amer. forces were withdrawn from Zone A, which was handed over (less one small strip of ter.) to the It. gov. Zone B (and the additional strip) came under Yugoslav civil administration. The U.N. Security Council was given notice of these 'practical arrangements.'

See *Commentary on the Treaties of Peace with Italy* (H.M.S.O.), 1947; *Memorandum of Understanding* (Cmd. 9288) (H.M.S.O.), 1954.

Trieste, Gulf of, see VENICE, GULF OF. **Trifolium**, family Leguminosae, a genus of nearly 300 species, including *T. pratense*, Red clover; *T. arvense*, Hare-foot; *T. hybridum*, Alsike Clover; *T. repens*, White or Dutch Clover; *T.*

campestre, Hop Trefoil; etc. *T. alpinum* and *T. uniflorum* are grown on rock gardens.

Triforium, or **Blind Storey**, in Romanesque and Gothic aisled churches, the stage of wall between the top of the nave arcade and the bottom of the clerestory, masking the lean-to roof over the aisle. The T. is usually pierced with open arcading.

Triglyph (Gk, literally 'three grooves'), in Gk architecture, a slightly projecting block placed at regular intervals in the frieze of the Doric Order (see ORDERS) and decorated with 3 grooves.

Trigonometry, in its primary meaning, signifies the measurement of triangles; it has a much wider scope, however, embracing all types of geometrical and algebraical investigations by means of certain quantities termed trigonometrical ratios. These ratios are defined as follows: Take any system of rectangular axes OX, OY, and with centre O describe a circle of any radius. On its circumference take any point P. Join OP, draw PM perpendicular to OX. Then the co-ordinates of P are (OM, MP), or in ordinary Cartesian notation (x, y), where $x = OM$, $y = MP$. If the angle POM be denoted

$$\text{by } \theta, \text{ then } \sin \theta = \frac{MP}{OP}, \cos \theta = \frac{OM}{OP}, \tan \theta = \frac{MP}{OM}, \operatorname{cosec} \theta = \frac{OP}{MP}, \sec \theta = \frac{OP}{OM}, \cot \theta = \frac{OM}{MP}.$$

The terms sin, cos, etc., are abbreviations for sine, cosine, tangent, cosecant, secant, and cotangent. From the above definitions the following relations hold: $\sin \theta = \frac{1}{\operatorname{cosec} \theta}$, $\cos \theta = \frac{1}{\sec \theta}$.

$\tan \theta = \frac{1}{\cot \theta}$. Also since OMP is a right-angled triangle, $MP^2 + OM^2 = OP^2$. $\therefore \left(\frac{MP}{OP}\right)^2 + \left(\frac{OM}{OP}\right)^2 = 1$, i.e. $\sin^2 \theta + \cos^2 \theta = 1$.

From these, other relations, such as $\sec^2 \theta = 1 + \tan^2 \theta$ and $\operatorname{cosec}^2 \theta = 1 + \cot^2 \theta$, may be deduced. In the construction of tables for the values of the different trigonometrical ratios of θ , the labour of finding these values is greatly minimised by the use of the following relations, it being only necessary to calculate these values as θ takes the various values from 0° to 45° . These relations may easily be proved by reference to the

$$\text{diagram, } \sin (90^\circ - \theta) = \frac{OM}{OP} = \cos \theta.$$

$$\cos (90^\circ - \theta) = \frac{MP}{OP} = \sin \theta, \tan (90^\circ - \theta)$$

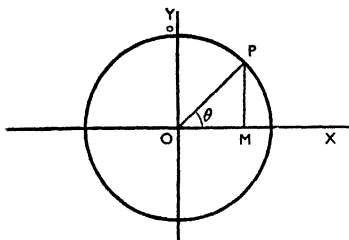
$$= \frac{OM}{MP} = \cot \theta. \text{ The following may also}$$

be easily deduced: $\sin (90^\circ + \theta) = \cos \theta$, $\cos (90^\circ + \theta) = -\sin \theta$; $\sin (180^\circ - \theta) = \sin \theta$; $\cos (180^\circ - \theta) = -\cos \theta$. Thus $\cos 170^\circ = \cos (90^\circ + 80^\circ) = -\sin 80^\circ = -\sin (90^\circ - 10^\circ) = -\cos 10^\circ$.

The **addition theorem** is useful in finding the values of the functions of the sum or difference of 2 angles, the values of these functions for each angle being known. $\sin (\theta + \phi) = \sin \theta \cos \phi + \cos \theta \sin \phi$

$$\cos(\theta + \phi) = \cos \theta \cos \phi - \sin \theta \sin \phi$$

$$\tan(\theta + \phi) = \frac{\tan \theta + \tan \phi}{1 - \tan \theta \tan \phi}$$



For differences, write $-\phi$ for $+\phi$ in the above, and note that $\sin \phi = -\sin(-\phi)$, $\cos \phi = \cos(-\phi)$, $\tan \phi = -\tan(-\phi)$. Often an angle is denoted by its trigonometrical ratio; this value is called the inverse function, e.g. $\sin^{-1}\frac{1}{2}$ is the angle whose sine is $\frac{1}{2}$, $\cos^{-1}\frac{1}{2}$ is the angle whose cosine is $\frac{1}{2}$. For the construction of tables, the sine and cosine functions are expanded into the following series:

$$\sin \theta = \theta - \frac{\theta^3}{3!} + \frac{\theta^5}{5!} - \dots \text{ad inf.},$$

$$\cos \theta = 1 - \frac{\theta^2}{2!} + \frac{\theta^4}{4!} - \dots \text{ad inf.},$$

where θ is measured in radians. Thus if θ° is value of the angle in degrees, the number of radians $= \frac{\pi \theta}{180}$. Trigonometry is applied to the solution of triangles. These triangles may be plane or spherical: the chief relations existing between the sides and the trigonometrical ratios of the angles in plane triangles are: $\frac{\sin A}{a} =$

$$\frac{\sin B}{b} = \frac{\sin C}{c}, \quad a^2 = b^2 + c^2 - 2bc \cos A,$$

etc., where A, B, and C denote the angles, and a, b, c the sides opposite to these angles. In spherical triangles $\frac{\sin A}{\sin a} =$

$$\frac{\sin B}{\sin b} = \frac{\sin C}{\sin c}, \quad \cos a = \cos b \cos c + \sin b \sin c \cos A.$$

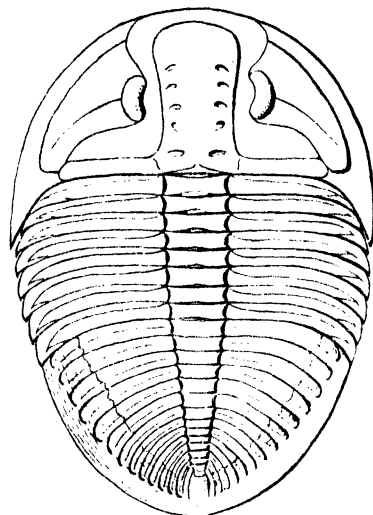
The sides a, b, c are the three arcs of great circles which form the spherical triangle, and the angles A, B, C are formed by the arcs at the points where they meet. The subject arose out of the study of astronomy, the Gk astronomer Hipparchus (160 bc) inventing it. The man who greatly extended the subject was Ptolemy, the Alexandrian astronomer. Regiomontanus made the subject a science quite independent of astronomy. See Todhunter, *Plane Trigonometry*, 1903; Todhunter and Leathem, *Spherical Trigonometry*, 1907; J. A. Bullard and A. Kiernan, *Plane and Spherical Trigonometry*, 1923; T. M. MacRobert and W. Arthur, *Trigonometry*, 1937-8; A. Page, *Trigonometry*, 1949.

Trihydroxypropane, see GLYCEROL.

Tri-iodomethane, see IODOFORM.

Trikkala, tn of Greece, cap. of the dept of T., 38 m. SW. of Larissa in Thessaly.

It is the chief mrkt for the pastoral products of the Pindus mts and for the crops of the Thessalian plain, wheat, maize, tobacco, and cotton. It is the see of an archbishop. Pop.: (dept) 128,000; (tn) 24,100.



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OGYGIOCARIS, AN ORDOVICIAN TRILOBITE

Trilene, or Trichlorethylene, see ANAESTHESIA.

Trilinear Co-ordinates, used in solid geometry. They are an extension of the principles developed in analytical (or co-ordinate) plane geometry. To the 2 imaginary perpendicular axes Ox , Oy is added a third, Oz , which is perpendicular to the plane containing Ox , Oy . The position of any point in space can then be defined by the T. C. x , y , z , representing the perpendicular distances of the point from the axes Ox , Oy , Oz respectively.

See also under GEOMETRY, Analytical.

Trillium, genus of perennial plants (family Liliaceae), with thick rhizomatous stems and roots, and a solitary nodding white, pink, or purple flower borne in the centre of a whorl of 3 leaves. *T. grandiflorum*, the wake robin, is often grown in gardens.

Trillo del Diavolo, Devil's trill, name given to Tartini's (q.v.) violin sonata. The work is in 4 movements, of which the finale contains the famous trill.

It is said to have been inspired by a dream in which Tartini bargained his soul with the devil in return for musical inspiration. On waking he wrote down

what he had heard, but related that the version as written fell far short of the devil's performance.

Trilobites, an extinct group of marine Palaeozoic arthropods in which the dorsal exo-skeleton has a prominent transverse trilobation, with a convex axial portion and flattened pleural areas. Longitudinally, the dorsal shield is also divided into 3 distinct parts, the head or cephalon, the flexible thorax, and the tail or pygidium. The body was divided into segments, each bearing a pair of biramous

Trim, cap. of co. Meath, Rep. of Ireland, on the R. Boyne. It is one of the oldest eccles. centres in Ireland, and St Patrick built the first church here. The huge T. castle is the largest Anglo-Norman fortress in the country. The Yellow Steeple was part of the 13th-cent. St Mary's Abbey (Augustinian). Dean Swift was rector of Laracor (2 m. S.) from 1700 to 1713, and Stella Johnson lived there. The Duke of Wellington was at school and later resident in T. To-day T. has agric. and light industries. Pop. 1400.



THE HARBOUR OF TRINCOMALEE

Brian Chirlian

appendages, but these are only rarely preserved. Some trilobites were burrowing or bottom-dwelling forms, while others were planktonic. Highly developed trilobites occur in the oldest Cambrian rocks; they reached their acme in Ordovician times, and died out in the Permian. They are valuable as index fossils.

Trilogy, group of 3 tragedies which are either connected by a common subject or each is a distinct story. In the great period of Attic drama all competitors who took part in the contest had to produce a T. and a satyric drama. The only surviving example is the *Oresteia* of Aeschylus consisting of the 'Agamemnon,' 'Choephorae,' and 'Eumenides.' Its satyric appendage is lost.

Trimethylamine, see AMINES; ETHYLAMINE.

Trimorphism, see DIMORPHISM.

Trimurti, in Indian religion, the later Hindu triad (q.v.), Brahma, Vishnu, and Siva, considered as an inseparable unity. T. implies the unity of the 3 principles of creation, preservation, and destruction, and is an expression of philosophical, rather than popular belief. The mystic word Om (Aum) used in prayer is said to be the symbol of the T., the letters A, U, and M standing for Brahma, Vishnu, and Siva respectively. T. as the representation of the Hindu triad consists of 1 human body with 3 heads, that of Brahma in the middle, that of Vishnu at the right, and that of Siva at the left.

Trinacri, or Trinacria, *see* SICILY.

Trincomalee, seaport on the NE. coast of Ceylon, with an excellent harbour. It is the site of the Temple of the Thousand Columns, a pilgrimage resort, reduced to ruins by the Portuguese during the 17th cent. T. was a Brit. naval base in Ceylon during the Second World War.

Tring, mkt tn of Herts, England. Here are Tring Park and the Rothschild zoological museum. T. reservoirs have recently been declared a national nature reserve by the Nature Conservancy. There is a trade in agric. produce. Pop. 5290.

Trinidad, the second largest W. Indian is. belonging to Britain, situated at the extreme S. of the chain of W. Indian is., immediately opposite to the delta of the Orinoco R., and lying between 10° 3' and 10° 50' N. lat. and 60° 55' and 61° 56' W. long. It is 4005 m. by sea from London and 1958 m. from New York. T. is rectangular with promontories at the 4 corners, those at the NW. and SW. being extended towards the mainland of S. America, of which, geologically, it is a part, and enclosing the Gulf of Paria, which is practically a land-locked sea between T. and Venezuela, with narrow straits at the N. and S. The Straits at the N. are called Bocas del Dragon or Dragon's Mouths, and those at the S. the Boca de la Serpiente or Serpent's Mouth. T. has an area of 1864 sq. m.; its average length is 50 m. and breadth, 37½ m. The NE. and S. coasts are steep and lofty, with few harbours, but on the W. the coast is low, rising gradually towards the interior, with fertile plains, hills, and valleys. The N. coast is much indented, but most of its bays are rock-bound excepting those of Maracas and Las Cuevas. The E. coast, being exposed to the Atlantic, is often unapproachable by shipping, and on the S. coast the bays of Erin, Quimam, Moruga, and Guayaguayare are so shallow that vessels have to lie well off the shore. Three mt ranges traverse the is. from E. to W. Between the N. (where Mt Aripo reaches 3085 ft) and the Central ranges the country is flat and well watered, but the land to the S. of the Central range is undulating and the water supply poor. The 3 most important and navigable rvs. are the Caroni, which drains the NW. portion of the is., the Ortoire, which drains the SE section, and the Oropuche draining the NE. Other rvs. are the Poole, the Navet, and another Oropuche in the SW. of the is. The climate is tropical yet not too warm. Agriculture and oil production are the chief occupations. An agric. dept with a highly trained technical staff, the Imperial College of Agriculture, founded in 1921, and a recently estab. microbiological laboratory, keep the colony abreast of the latest discoveries tending to the improvement of its soil and flora. Since 1954 the E. Caribbean Farm Institute at Centeno, Arima, has supplemented this work by training suitable staff. There is a fisheries experimental station at Bamboo Grove. The chief agric. products are sugar, coconuts, and cocoa. Other crops

are citrus fruits (lime, grapefruit, and oranges), coffee (both robusta and arabica), rice, and bananas. T. is the source of Angostura bitters, the manuf. of which was transferred to the is. from Angostura or Ciudad Bolivar in 1875, owing to the troubled state of Venezuela. The prin. mineral products are crude petroleum (output for 1954 was 23,628,000 barrels), asphalt (output 142,100 tons), building stone, and road metal. On 1 Aug. 1956 the gov. sold the T. Oil Company to the Texas Oil Company under conditions calculated to ensure greater production and more income for the is. workers. One of the features of the is. is the pitch lake at La Brea, which contains an enormous supply of asphaltum. The lake occupies 114 ac. Oilfields are being developed, and the is. is now the second largest producer of petroleum in the Commonwealth. The prin. exports are petroleum, asphalt by-products, cocoa, sugar, and rum. Exports in 1954, including re-exports, were worth \$261,600,000, a surplus of \$12,100,000 over imports.

In 1955 192,793 tons of sugar were manufactured, representing one-tenth of the weight of the cane grown. The oil industry contributes directly and indirectly some 40 per cent of the gov.'s revenue. The cocoa grown in T. is the best in quality in the world. Coconuts and products of coconuts are a valuable subsidiary industry. Secondary industries include the manuf. of cement, beer, glass, and matches. T. is reasonably stable and prosperous, the budget for 1955 balancing at about \$81,600,000 (about £17m.). There exist, however, poverty, some unemployment, disease, and an acute housing shortage. The overall pop. is about 721,000 (including Tobago, 34,000). Of these some 50 per cent are W. Indian, i.e. of W. African origin; there are about 300,000 E. Indians (mostly Hindus, but with large Christian and Muslim sections among them); the remainder are chiefly of Brit., Fr., Sp., and Portuguese descent, as well as Chinese, Syrians, Jews, and others (the pop. of Tobago is mostly W. Indian).

In 1946 universal adult suffrage was introduced, thereby increasing the electorate from 30,000 to 250,000. The present constitution, which came into force in 1956, provides, as did its predecessor, for single-chamber gov. only; it brings T. in line with Barbados and Jamaica in their progress towards self-gov. within the Commonwealth. The legislature or Legislative Council consists of 2 *ex officio* members (the colonial secretary and attorney-general), 5 members nominated by the governor, and 24 elected members. The speaker is elected by the Legislative Council from among their own number. The Executive Council comprises the governor as chairman, the 2 *ex officio* members of the Legislative Council, and 8 ministers. A chief minister chosen by the Legislative Council leads the gov. in both Legislative and Executive Councils and selects the other ministers. The Executive Council is the chief instrument of policy, and in

all ordinary circumstances the governor is obliged to act upon its advice. At the election of 1950, 4 parties won seats, and 6 Independent members were elected. The report of the 1955 Constitutional Reform Committee is expected to develop this liberalisation.

Co. councils were estab. in 1946 and granted executive powers in 1952, the chairman of each council being elected members on the legislature of the colony (there are 8 cos.). There are 504 primary

109 m.: one line runs through St Joseph and Arima to Guanapo and passes through some of the cacao dists., affording fine views of the Central Range of mts. Four wireless stations are maintained by the gov. Under an agreement concluded 27 Mar. 1941 defence bases have been leased to the U.S. Gov. for a period of 99 years. There is a civil airfield at Piarco, and an emergency airfield at Toco (N. T.), and 4 other landing strips. Wireless and wired broadcasting are operated



MARACAS BAY, TRINIDAD

Camera Press

and intermediate schools in the colony, including both gov. and assisted schools. The majority of the latter are Rom. Catholic, Church of England, and Canadian Presbyterian. There are 2 gov. secondary schools, 1 for boys and 1 co-educational, and 12 assisted secondary schools, 4 for boys, 6 for girls, and 1 co-educational. The Supreme Court of T. is a superior court of record, and consists of a chief justice and 6 puisne judges, and its jurisdiction is assimilated as nearly as possible with the practice and procedure in the High Court of Justice in England so far as not displaced by local rules of court. There are also petty civil courts in various parts of the colony and magistrates' courts.

There are 1407 m. of main and 1059 m. of local roads. There is a gov. railway of

by a commercial company. Port of Spain (q.v.) (pop. 114,000), the cap., has many modern amenities. Other important tns are San Fernando and Arima.

History. T. was discovered by Columbus on his third voyage, in 1498, and taken possession of by him for the King of Spain. He named it La Trinidad or 'The Trinity.' Columbus never came to T. again, and the Spaniards made no attempt to found a settlement for over 30 years. The aboriginal Arawak Indians called the is. 'Iere' or 'The Land of the Humming Bird,' a name by no means inappropriate until recent times. For almost 2 cents. after the discovery of T., the is. remained as undeveloped as it was before the advent of Columbus, a prey to internecine strife between the fierce Caribs and the milder-mannered Arawaks and to the cruelties of

the Spaniards in quest of mythical gold. Sir Robert Dudley (or Dudley) (styled Duke of Northumberland and Earl of Warwick) with Capt. Munck, sailed to Cedros Bay in 1595, but, growing tired of waiting for Sir Walter Raleigh, whom he expected to meet in T., he sailed for the Orinoco. Ten days later Raleigh sailed into Cedros Bay and up to La Brea (which he describes in his *Discoverie of Guiana*, Hakluyt series). In T. he learned that the Sp. governor intended to cross to Guiana in quest of El Dorado. Unwilling to leave a Sp. garrison in his rear, he hurled his force on the Sp. Corps du Guard, put them to the sword, and sacked the little tn of San Jose de Oruna. In the 17th cent. T. was twice raided (1640, 1677) by the Dutch and, in 1690 by the Fr., rivalry among the chief maritime powers being at its height. These raids had some unifying effect on the activities of the inhab., for, despite the mercantilist policy of the Sp. gov., there was a considerable growth of trade (especially in 1695). Towards the end of the 17th and the first decade of the 18th cents. cocoa was successfully cultivated in T., but a blight destroyed the plantations (c. 1725) and T. made little further progress until 1783, when a royal proclamation was issued, by which extraordinary advantages were offered to foreigners of all nations to settle in T., on condition that they were Rom. Catholics. The result was a large influx of pop., which was soon augmented by many Fr. families who were driven from St Domingo (q.v.), Haiti (q.v.), and elsewhere in consequence of the Fr. Revolution. To this cause is to be traced the preponderance of the Fr. element in a colony which never (like, e.g. St Lucia) belonged to France. On 18 Feb. 1797 articles of capitulation were signed by the Spanish by which England's sovereignty over the is. was recognised. The final cession of the colony took place in 1802 under the Treaty of Amiens.

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Trinidad: 1. City on the S. coast of Cuba, 175 m. SE. of Havana, and 45 m. by rail from Santa Clara through beautiful scenery. Altitude 1000 ft. It is an interesting old tn, founded in 1514, and

the dwelling-house of Cortés (q.v.) when he was alcalde of Santiago de Cuba is still in existence. T. exports sugar and honey, and has general agric., dairy, and tobacco production. Pop. 15,500.

2. Tn of Bolivia, in Beni Prov., of which it is the cap., 265 m. NE. of Cochabamba. It is a few m. from the Mamoré R. in a hot malarial region, and is one of the most important trading centres in NE. Bolivia, with important air and riv. facilities, in an area producing cotton, cacao, sugar, and cattle. Pop. 15,500.

3. Cap. of Flores dept, Uruguay, on a branch of the central railway, 100 m. NW. of Montevideo. T. produces wheat, linseed, fruit, and vines, and cattle and sheep are raised. Pop. 15,750.

Trinitarians, or **Redemptionists**, Fr. religious order founded by John of Matha and Felix of Valois for the redemption of Christians captive among infidels. The T. were founded in 1198 and followed the rule of St Augustine.

Trinitro-phenol, see **PICRIC ACID**.

Trinitrotoluene, 'T.N.T.', high explosive, $C_7H_5(NO_2)_3$, largely used in the World Wars. It is a pale yellow crystalline solid, m.p. 80-8° C., prepared by acting upon toluene (q.v.) with a mixture of concentrated sulphuric and nitric acids. See **EXPLOSIVES**.

Trinity, see **JAN MAYEN ISLAND**.

Trinity, The Blessed, term used for the highest mystery of the Christian faith, the doctrine that God, while one in nature and being, is 3 distinct persons, the Father, the Son, and the Holy Spirit. In the O.T. this doctrine is barely adumbrated, for the Jews had to learn to maintain the ethical holiness and the unity of God as against immoral polytheism. In the N.T. we meet the Son of God, who is divine and a third Person in whom divine attributes are recognised. The 3 persons are grouped in the formula of Matt. xxviii. 19: 'Baptising them in the name of the Father and of the Son and of the Holy Ghost.' The development of these concepts and convictions was the work of the early cents., and the clear expression of the doctrine was the fruit of Gk thought. In the W. the great exponent of Trinitarian doctrine is St Augustine of Hippo (*De Trinitate*). The fullest expression, however, is found in the *Quicumque Vult*, the so-called Athanasian Creed (q.v.). See **HOLY SPIRIT**; **CONSUBSTANTIAL**.

Trinity College, Cambridge, incorporates Michaelhouse founded in 1324 by Hervey de Stanton, chancellor of the Exchequer to Edward II, and King's Hall, founded in 1337 by Edward III. The fusion was effected in 1546 by Henry VIII who largely endowed the college. The Great Gate and the clock tower were built for King's Hall. The present chapel was completed in 1564. The lay-out of Great Court and the fountain and Neville's Court (modernised in 1756) were the work of Dr Thomas Neville, master 1593-1615. The library is by Wren with busts by Roubilliac and carvings by Grinling Gibbons. T. C. is a miniature univ. Amongst famous members have been Bacon, Byron, Dryden,

Macaulay, Isaac Newton, Tennyson, and Thackeray. See G. M. Trevelyan, *Trinity College*, 1943.

Trinity College, Dublin, univ. of Dublin, founded in 1591. During the 16th cent. many efforts were made to found a univ. in Dublin. In 1590 Adam Loftus, Archbishop of Dublin, and other influential persons brought matters to a conclusion, and the mayor and corporation of Dublin were persuaded to give the old Augustinian monastery of All Hallows, granted to them at the Dissolution, for the site. In 1591 royal assent for the foundation of the college was sought, and the college was incorporated on 3 Mar. 1592, Wm Cecil, Lord Burghley, being the first chancellor and Loftus the first provost. 'The College of the Most Holy and Undivided Trinity of Queen Elizabeth, near Dublin' was founded as *mater universalis*, but no other colleges were ever founded, with the result that the univ. of Dublin and Trinity College, Dublin, are inextricably entangled. The college continues to occupy the 30-ac. site originally granted, now in the heart of the city. At the W. of the site are the 18th-cent. buildings: the chapel, public theatre, dining-hall, and library. The library has many treasures, including the Book of Kells, and continues to enjoy Brit. copyright privileges. There is residential accommodation for 350 male students. Women students are accommodated in Trinity Hall in the suburbs. In the centre of the site are the playing-fields. At the E. of the site are the 19th- and 20th-cent. buildings for the scientific and medical departments. There is a botanic garden at Ballsbridge. In 1871 the last traces of religious tests were abolished, and in 1903, women were admitted to degrees. The univ. returns 3 members to Seanad Éireann.

Many famous Irish names appear on the rolls of the college, including those of satirists, poets, novelists, orators, scientists, historians, publicists, and politicians of every party. Among very many, Wm Congreve, Oliver Goldsmith, Henry Grattan, Wolfe Tone, Jeremy Taylor, Edmund Burke, James Ussher, Jonathan Swift, and George Berkeley may be listed. See Constantia Maxwell, *A History of Trinity College, Dublin, 1591-1892*, 1946 (contains full bibliography); Kenneth C. Bailey, *A History of Trinity College, Dublin, 1892-1946*, 1947.

Trinity College, Oxford, founded in 1555 by Sir Thomas Pope on the site of the former Durham College, dissolved priory of the Benedictine House at Durham. Its main beauties are the chapel (rebuilt 1691-4) and the garden. Famous members have included Lord Chatham, Lord North, W. S. Lander, Cardinal Newman, James Elroy Flecker, Archbishop Davidson, A. E. W. Mason, Lord Goddard, and Monsignor Ronald Knox.

Trinity Friars, see CRUTCHED FRIARS.

Trinity Hall, Cambridge, founded in 1350 by Wm Bateman, Bishop of Norwich, for the study of canon and civil law. The buildings were much altered early in the 18th cent. T. H. has always had, and still retains, a strong legal tradition.

Trinity House, name of 5 maritime societies, of which only the 'Corporation of Trinity House of Depford Strond', London, retains its anc. powers and privileges. The others, at Leith, Dundee, Hull, and Newcastle-on-Tyne, dwindled to mere benefit societies. The London House, however, still retains the management of some of the most important interests of the seamen and shipping of England as the general lighthouse authority for England, Wales, and the Channel Islands and the principal pilotage authority in the U.K. Its corporation consists of a master, deputy-master, and 9 elder brethren, usually 1 R.N., and 8 Merchant Service, 2 of whom sit as Nautical Assessors in the Court of Admiralty. In cases where any question upon navigation is likely to arise. There are also many younger brethren, and sev. honorary elder brethren, e.g. H.R.H. the Duke of Edinburgh, Sir Winston Churchill, Earl Mountbatten of Burma. The Corporation received its first Charter on 20 May 1514 from Henry VIII, but it is clear from this document that the 'guild of fraternity' existed prior to that date. The T. H. of Hull began in the 14th cent. as a religious fraternity seemingly connected with a guild of shipmen, which survived the dissolution of religious guilds in 1547.

Trinity Sunday, the first Sunday after Pentecost, or Whitsunday, observed by the Rom. Catholic and Anglican Churches. The Anglican Church, following the Sarum Use, names the succeeding Sundays *after Trinity*, while the Rom. Catholic Church reckons them *after Pentecost*. The Sarum and Anglican practice may be due to the Eng. origin of the feast. Gervase of Canterbury says that St Thomas Becket instituted it in England soon after his consecration in AD 1162. It was made a universal observance by John XXII.

Trinoda Necessitas, duties laid upon holders of land in A.-S. England, comprising the manning of fortified places, repair of bridges, and service in the fyrd. The term 'obligations' was used in A.-S. documents: T. N. is a 17th-cent. phrase.

Trinovantes, tribal group of non-Belgic character, who lived N. and NE. of the Thames in the latter part of the Early Iron Age in Britain. Caesar accepted their submission, as did Claudius in AD 43. The T. joined the revolt of the Iceni under Boudicca (Boadicea) and suffered as a result. Their cap. was made into the colony of Camulodunum, now Colchester.

Trio, musical composition or movement for 3 vocal or instrumental parts; more particularly a chamber work for 3 instruments, especially violin, cello, and pianoforte (pianoforte T.), or violin, viola, and cello (string T.); also the alternative section in a minuet, scherzo, march, or sometimes other kinds of movement in a sonata-form work, so called because originally such sections were by convention written in 3 parts.

Triolet, poem of 8, usually 8-syllabled, lines, with only 2 rhymes, arranged abaaabab. The first line is repeated as the fourth and seventh, and the second as the eighth, so that there are only 5 lines

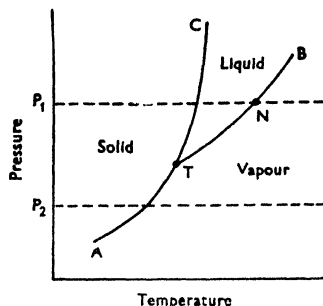
of independent sense. The T. has been described as a short form of the rondeau (q.v.).

Triphenylmethane, $\text{CH}(\text{C}_6\text{H}_5)_3$, is obtained by the action of benzal chloride, $\text{C}_6\text{H}_5\text{CHCl}_2$, on benzene, in presence of aluminium chloride; or from benzaldehyde and benzene in conjunction with zinc chloride. It forms colourless prisms melting at 93°C . and boiling at 359°C . It is the parent substance of a number of dyes. Thus by the condensation of benzaldehyde and dimethylaniline with zinc chloride, leucomalachite green is obtained (the leuco base), which, on oxidation with lead dioxide and hydrochloric acid, gives rise to the colour base (a carbinol), and this loses water to give the dye *malachite green*. *Crystal violet* is another example. *Pararosanine* can be made by the condensation of *para*-toluidine (1 molecule) and aniline (2 molecules) in presence of arsenic acid. *Rosaniline* is similarly obtained from a mixture of *ortho*- and *para*-toluidines. In each case the colour base formed loses hydrogen to give the dye. See DYE.

Triple Alliances. The first was ratified between the States-General and England against France in 1668 for the protection of the Sp. Netherlands. It was afterwards joined by Sweden, thus forming a T. A. Another was arranged in 1717 between England, the Netherlands, and France against Spain, and after the accession to it of Austria in 1718 it was known as the Quadruple Alliance. In 1788 England, Prussia, and the Netherlands allied, and in 1795 England, Russia, and Austria. About 1882 an alliance was arranged between Germany, Austria, and Italy to check the power of Russia and France. Although this T. A. expired in 1892, it was renewed and extended for a number of years, and this, together with the dual alliance between France and Russia and the triple entente between England, France, and Russia, was relied upon to preserve the balance of power between the great nations of the world. The T. A. was last renewed in 1912, and it bound Italy to the Central Powers in a defensive alliance. However, during the First World War Italy's initial neutrality became gradually less 'benevolent', and eventually on 4 May 1915 Italy denounced her treaty of alliance with Austria-Hungary. See further under ITALY; see also EUROPE; WORLD WAR, FIRST.

Triple Point. The variation of boiling point with pressure can be indicated on a graph of pressure plotted against temp., as shown by the line TB in the figure. At a given pressure P_1 , the substance is liquid at temps just below the temp. corresponding to the point N, and is a vapour for higher temps. Similarly, the relation between freezing point and pressure can be represented by the line TC, and the region between TC and TB will correspond to the liquid phase or state. For lower pressures, e.g. P_2 , the solid can pass directly into the vapour phase by heating alone—this is known as sublimation (q.v.), and the temp. at which it occurs also varies with pressure as

shown by the line TA. These 3 lines meet at the point T, known as the Triple Point. Under the conditions of temp. and pressure corresponding to T, the 3 phases, solid, liquid, and vapour, can coexist in equilibrium. For some substances this diagram, known as the Phase Diagram, is more complicated, mainly



because of the existence of different crystalline structures for the solid. In the case of water the melting line TC slants to the left, indicating that ice (q.v.) can be melted at a given temperature by the application of pressure, a process known as regelation.

Tripoli, seaport and city of N. Africa, cap. of Tripolitania, itself sometimes known as Tripoli. Situated on a promontory of the Mediterranean, it is a typical Moorish city, containing a Sp. fortress, many beautiful gardens, and sev. fine mosques. A notable feature is the arch of Marcus Aurelius in marble. During the It. occupation a number of modern gov. buildings were erected, together with a fort. T. is at the junction of caravan routes to Timbuktu, Lake Chad, and Darfur, and 3 railway lines diverge from it to Zuara, Garian, and Tagiura; it is connected by telegraph cable with Malta and Syracuse. It has a court of assize and a court of appeal. The city was repeatedly bombed by the R.A.F. in 1941-2. With its capture on 23 Jan. 1943 the Eighth Army secured the best N. African port between Tunis and Alexandria. (See also AFRICA, NORTH, SECOND WORLD WAR, CAMPAIGNS IN.) Pop. 130,238 (Italians, 39,000).

Tripoli, tn of the Lebanon, 40 m. NNE. of Beirut, its port being El Mina. There are rail connections with Haifa and Homs. In 1109 T. was taken by the Crusaders. A varied trade is carried on in oranges, silk, etc. Pop. 80,000.

Tripolitania, prov. of Libya, a former It. ter. of N. Africa, stretching from the Mediterranean some 800 m. into the Sahara Desert. Cap. Tripoli, pop. 130,238. Total pop. 764,064, including 45,000 Italians (1956). Tunis and Algeria lie to the W., and the Libyan prov. of Cyrenaica to the E. The greater part of the coast-line is low and sandy, and thus quite unfit for harbourage. There are

no rivs. of importance. The country is flat near the coast, but there are low mt ranges in the W., centre, and S. There are fisheries for sponges and tunny along the coast, but T. is almost an entirely agric. country, possessed of no minerals but salt, which, however, is of excellent quality and produced in large quantities. Along the coast all kinds of Mediterranean fruit, palms, olives, etc., are produced. Farther inland are grown barley and wheat, olives, tobacco, mulberries, figs, almonds, dates, and the vine. There is good pasture land for cattle and sheep. It is in this part of T. that lt. colonisation was thickest. Farther inland come the dunes, which, during the lt. occupation were afforested with poplar, pine, acacia, and robinia; next comes the mt dist., which produces vines, figs, and olives. The sub-desert zone, still farther inland, produces only alfa, a source of cellulose, and farther S. still is the desert itself, barren save for fertile oases. The chief exports are tobacco, dates, figs, olives, grapes, almonds, salt, barley, esparto grass, ostrich feathers, and sponges, and the chief imports, foodstuffs, cotton, and metal goods. There is an important caravan trade with the central Sudan. About 144 m. of railroad are centred on Tripoli, the cap. and chief port. Other centres are Sirte, Azicz, Noflia, Misurata, Homs, and the oasis of Ghadames.

The remains of anct Rom. houses, baths, theatres, and temples tell of the first Rom. occupation over 2000 years ago. T. then enjoyed a long period of prosperity. It was rich in grain and olive oil, and it supplied a third of the corn imported by Rome. In later cents. Arabs from the E. conquered T., bringing with them the new faith of Mohammed. During the 16th cent. T. came under Turkish rule, and in 1835 was made into a vilayet of the Ottoman empire. In Sept. 1911, however, Italy, which had long been dissatisfied with its relations with Turkey, issued an ultimatum, which was immediately followed by war. The tn of T. was blockaded, and in the beginning of Oct. the whole ter. was annexed. This annexation was recognised by the treaty of Ouchy in Oct. 1912. T. was thereafter, until the Second World War, administered under the It. Colonial Ministry. The lt. policy of energetic development met with a severe check at the beginning of the First World War, when there was a general rising of the natives. Not until the governorship of Giuseppe Volpi, 1921-5, was order thoroughly restored. In 1919 the W. frontier was fixed by arrangement with France, and in 1928 effective occupation was greatly extended. S. T. was united to Cyrenaica in 1938 to form lt. Libya (q.v.) as it was under lt. rule until 1939.

In the Second World War the Italians were driven out of N. Africa, and T., like the other former It. colonies, was occupied by the Allied forces, Italy having by the peace treaty (Art. 23) renounced all right and title to these possessions, the final disposal of which remained to be determined by the Allies, Brit. administration

meanwhile being estab. Later, in 1956 the Standard Oil Company of California obtained a 50 per cent interest in an oil exploration concession covering an area of approximately 14,200,000 ac. in T. and Cyrenaica. For the campaign of 1943, see AFRICA, NORTH, SECOND WORLD WAR, CAMPAIGNS IN; TRIPOLI.

See H. M. de Mathusleux, *La Tripolitaine d'hier et de demain*, 1913; W. K. McClure, *Italy in North Africa*, 1913; V. Mantegazza, *La Tripolitania*, 1913; F. T. Marinetti, *La Battaglia di Tripoli*, 1912; E. Camevari, *La Tripolitania*, 1924; L. C. Férard, *Annales tripolitaines*, 1927; G. E. Simpson, *The Heart of Libya*, 1929; R. di Lauro, *Tripolitania*, 1932; M. Moore, *Fourth Shore: Italy's Mass Colonisation of Libya*, 1940; G. Casserley, *Tripolitania*, 1943; H. J. Legg, *Economic and Commercial Conditions in Libya* (H.M.S.O.), 1953.

Tripolite, see KIESELGUHR.

Tripes, final examination for the honours degree at Cambridge Univ. The name recalls the 3-legged stool (Gk *tripous*) on which an 'old bachelour' sat when the senior bachelor for the year propounded to him 2 questions. The T. examination is taken in more than 1 subject, each course of study having 2 parts which may be inter-changed. The first part is devised as a 2-year course and the second generally as a 1-year course; so that the T. may be taken in 2 parts over the ordinary 3 years' residence at Cambridge.

Triptolemus, son of Celeus and Metanira, who dwelt in Eleusis. See THESMOPHORIA.

Triptych (Gr for threefold), a tablet, picture, or altar piece, made in 3 sections that fold together. See DIPTYCH.

Trirème, anct Gk warship, held by some to have been of Phoenician if not of Egyptian origin. It was a light craft about 120 ft long with a beam of some 20 ft; was fitted with 2 masts, except when in action; and normally carried 200 men, of whom 170 were rowers, 10 marines, and 20 seamen. The prow was armed with a strong 'beak' and other projections for ramming. The T.'s speed was probably 4 or 5 knots. The arrangement of oars is the subject of much discussion; but the theory that there were 3 distinct banks one above the other is now usually rejected in favour of forward-sloping benches, each occupied by 3 men with 1 oar piece. The gradual strengthening of the bows, which enabled T.s to meet a head-on attack, led to the construction of heavier quadriremes and quinqueremes with relatively greater oar-power; and these had become the standard warships by Hellenistic times. See C. Torr, *Ancient Ships*, 1894; W. W. Tarn, 'The Greek Warship' (*Journal of Hellenic Studies*), 1905; F. Brewster, 'The Arrangement of Oars in the Trirème' (*Harvard Studies*), 1933.

Trisagion (Gk *tris*, thrice, *hagios*, holy), name of a short hymn in the Eucharistic liturgies of the E. Churches, so called from the threefold repetition of *hagios*, O holy One! In the W. Churches it is found only

in the liturgy of Good Friday at the 'adoration of the cross.'

Trismegistus, see HERMETIC BOOKS.

Tristan, or **Tristram**, hero of romantic Celtic legend. The scene of the story, which deals with the tragic and fateful love story of T. and the 2 Iseults, Iseult of Ireland and Iseult of the fair hand, is laid in Ireland and Brittany, but chiefly in Cornwall at the court of King Mark.

Tristan da Cunha, prin. of a group of is. discovered by the Portuguese navigator of that name, lying in 37° 6' S. lat. and long. 12° 2' W., some 2000 m. W. of the Cape of Good Hope. Its inhabitable area is 12 sq. m. The other is., Inaccessible, Nightingale, and Gough Is., or Diego Alvarez, are uninhabited. They are Brit. possessions, which, in 1938, were made dependencies of St Helena. In 1956 the islanders of Tristan numbered 286, nearly all of whom were born in the is. T. is an extinct volcano (7640 ft) with a crater lake near its summit. The inhab. have about 250 head of cattle, 750 sheep, and a stock of poultry. Potatoes are the staple diet. There is a crayfish canning and freezing industry on the is. which exported some 27,000 cases to S. Africa in 1954-5. About 10 ships a year visit the is., about 5 bringing the inward mail and stores, most of which have to be imported. Sale of postage stamps first issued in 1954 brought the is. administration a revenue of about £23,000 in the first year. There is a daily radio-telegraph service with Cape Town. The is. is in charge of an Administrator. A Brit. survey expedition visited Gough Is. (230 m. SSE. of Tristan) in 1955-6.

T. was taken possession of by a military force during the residence of Napoleon at St Helena. When the garrison was withdrawn in 1817 Wm Glass, a corporal of artillery, and his wife, elected to remain, and they were joined by 2 ex-naval men; these, with some shipwrecked sailors, were the founders of the present settlement. After some years the 5 unmarried settlers contracted with a sea capt. to bring them wives from St Helena. Stores and provisions were provided out of a grant voted by Parliament and sent out by a warship, nearly all the able-bodied men having been drowned while attempting to board a vessel in Dec. 1885. In 1904 the is. was visited by H.M.S. *Odin* in order to ascertain whether the islanders would accept the offer of the Cape Gov. to settle them in the Cape Colony, but out of 11 families only 3 elected to go. During the Second World War detachments of the R.N. and the S. African Air Force were stationed on the is. to maintain a meteorological and wireless station. See Mrs Rose A. Rogers, *The Lonely Isle*, 1926; Douglas M. Gane, *Tristan da Cunha: an empire outpost and its keepers*, 1932; E. Christophersen, *Tristan da Cunha, the lonely isle*, 1940; A. B. Crawford, *I went to Tristan*, 1941; J. Brander, *Tristan da Cunha*, 1940; P. A. Munch, *Sociology of Tristan da Cunha*, 1945; D. M. Booy, *Rock of Exile*, 1957.

Tristearin see STEARIN.

Tristram, see TRISTAN.

Tristram Casket, The, famous piece of early medieval art, a casket of wood with 5 decorative panels of carved ivory depicting the romance of Tristram and Iseult. It came to light in 1913 in the shop of an unknown Paris dealer; it was acquired for the Brit. Museum in 1948 with the assistance of a grant from the National Arts Collection Fund. It is generally regarded as of late 12th cent. date, and is ascribed to the Rhineland or possibly E. France.

Tritoma, earlier name of Kniphofia (q.v.).

Triton, son of Poseidon and Amphitrite, represented as human to the waist and dolphin below, usually blowing a shell to calm the seas.

Triton, satellite of Neptune (q.v.).

Tritonia, family Iridaceae, genus of 16 S. African cormous plants, related to Monbretia and Crocosmia. *T. flavida*, is hardy, but *T. crocata* and *T. hyalina* with their many-flowered colourful heads need greenhouse shelter.

Triumph, highest honour accorded to a victorious commander among the Romans. Only a dictator, consul, or praetor holding the imperium or highest command was entitled to the distinction, and then only after success in true warfare, not rebellion, civil strife, etc. The honour with necessary expenses was granted by the senate, who assembled outside the city to receive the victorious gen., still in command. The celebration took the form of a procession to the Capitol through the city; the streets were decorated with garlands, and the procession, headed by the senate and state officials, passed through crowds of spectators, who greeted it with cries of '*Io triumphe*.' Next came trumpeters, then the spoils and trophies, and the crowns presented to the gen. by provincials. Following these came the sacrificial bulls, captives in chains, victors, musicians, and priests. Immediately behind was the triumphal car, gilded, garlanded, and drawn by white horses; in this stood the gen. wearing the garb of the Capitoline Jupiter, the purple *tunica palmata*, and *laga picta*, the former decorated with palm shoots, the latter with golden stars. An ivory sceptre surmounted by a golden eagle was carried in the left, a branch of bay in the right hand. Over his head a slave held the golden crown of Jupiter. Then followed the soldiers. Arriving at the Capitol, solemn sacrifice was made, and general festivity followed in the city. When the senate refused to authorise a T., the gen. might undertake one on his own account to the temple of Jupiter Latiaris, or he might be granted an ovation (q.v.).

Triumviri, 3 magistrates who constituted themselves supreme heads of the Rom. rep. The first triumvirate, or board of triumvirs, was that of Julius Caesar, Pompey, and Crassus (60 bc), and the second, and last, that of Augustus, Antony, and Lepidus (43 bc). The term was also applied to groups of 3 ordinary magistrates, or sometimes extraordinary commissioners, appointed to execute some public office. *T. capitales* were first

appointed c. 292 BC to help to preserve public order and to administer the law in capital cases.

Trivandrum, tn of former Travancore (q.v.) State, India, and site of the residence of the Maharajah. There are many palaces; the alleged reason is that each Maharajah built a new one. T. is also the site of the univ. of Travancore.

Tirnov, see TYRNOVO.

Troad, The, see TROY.

Troas, see TROY.

Trobriand Islands, a small cluster of is. in NW. Melanesia. The inhab. are among the anthropologically best-known peoples in the world, due to the writings of the late Bronislaw Malinowski (q.v.). The islanders are divided into 4 matrilineal clans, each with its chief, one being of higher status than the others. Their staples are yams and fish, and they are great navigators. They engage in a trade with neighbouring is. in the exchange of particular valuables, armbands and necklaces, known as the Kula (q.v.) exchange. See B. Malinowski, *Argonauts of the Western Pacific*, 1922; *Crime and Custom in Savage Society*, 1926; *The Sexual Life of Savages in North-Western Melanesia*, 1929; *Coral Gardens and their Magic*, 1935.

Trocadero Palace, see CHAILLOT.

Trochee (Gk *trechein*, to run) metrical foot, which in the classical quantitative system consists of one long and one short syllable, and in the Eng. accentual system of one accented and one unaccented syllable.

Trochilus, see HUMMING-BIRDS.

Trochu, Louis Jules (1815-96), Fr. gen., b. Le Palais (Belle-Isle-en-Mer.). He exposed in his anonymously pub. *L'Armée française en 1877* the crying need of military reforms. Served in the Crimean campaign and in Italy (1859) and in 1866 was engaged in the War Ministry on army reorganisation. As governor of Paris during the melancholy siege of 1870 he made the best of inadequate resources. On the outbreak of the Franco-Ger. war of 1870 he was refused a field command, but following the disasters of 1870 he was made governor of Paris and Commander-in-Chief of all the forces organised for the defence of the cap. He put the city in a good state of defence. At the revolution of 4 Sept. he was made president of the Gov. of National Defence, and his plan for defending the city failed; but though he resigned the governorship of the cap. in Jan. 1871, he retained the presidency of the gov. until after the Armistice. Elected to the National Assembly, for Morbihan, he retired in 1872.

Troglodytes, general Gk name for uncivilised cave dwellers of the Caucasus, Ethiopia, and along the S. Red Sea coast of Egypt.

Trogon (Gk *trōgōn*, pres. part. *trōgetin*, to gnaw), bird of the genus *Trogon* or family Trogonidae, widely distributed in tropical and subtropical regions, especially in America. It is about the size of a thrush. It has soft plumage of varied and generally brilliant colouring, particularly marked in the quessal (q.v.)

species, and is noted for its short, spasmotic flight.

Trogon, Long-tailed, see QUESAL.

Trogus Pompeius, Rom. historian of Gallic origin, who lived in Rome during the reign of Augustus. He wrote *Historiae Philippicae*, a hist. (with numerous digressions) of the Macedonian empire down to the Rom. conquest of the E. Selections are preserved in the *Historiarum Philippicarum Libri XLIV* of Justinus (2nd cent. AD).

Troilus, son of Hecuba and Priam, King of Troy, who was slain in battle or taken captive by Achilles. Chaucer unfolds in *Troilus and Cressid* and Shakespeare in *Troilus and Cressida*, a tale of faithless love derived from medieval pseudo-Homeric writings.

Trois-Rivières, city of Quebec, Canada, on the N. shore of the St Lawrence R., at the mouth of the St Maurice R., half-way between the cities of Montreal and Quebec. It is a natural ocean port and the pop. is largely Fr.-Canadian. The city is the see of a Rom. Catholic bishop. T.-R. was founded in 1634, and the first Canadian industry, 'The Old Forges,' was estab. there in 1737, where nails, stores, kettles, and frying-pans, previously imported from France, were manuf. The city is now a large producer of newsprint and a centre of the textile industry. It possesses important metallurgical plant and is the gateway to one of Canada's greatest sources of electrical energy. Pop. 50,220.

Troitse-Sergievva Lavra, monastery of the Holy Trinity, the biggest Russian Orthodox monastery, founded c. 1340 by St Sergius of Radonezh (q.v.), situated 44 m. N. of Moscow, and now within the tn of Zagorsk (q.v.). It has outstanding 15th-18th-cent. architectural monuments, including the Cathedral of the Holy Trinity (built 1423 in the Early Muscovite style), the Cathedral of the Assumption (1559-85), the baroque bell-tower (1741-70), etc. In the 14th-17th cents. T.-S. L. was an important religious, cultural, and political centre, supporting the centralistic policy of the Muscovite princes and tsars. The monastery was abolished in 1920 and transformed into a museum. From 1814 to 1918, and again from 1948, it has housed the Moscow Theological Academy.

Troitsk, tn in the Chelyabinsk Oblast of the Urals, 85 m. S. of Chelyabinsk. It has agric. industries and is an important railway junction. It is a local cultural centre. Founded in 1743 as a Russian fortress, T. has a lively trade in agric. products. Pop. (1956) 68,000.

Troitskosavsk, see KYAKHTA.

Trojan Planets, group of asteroids (q.v.), namely Achilles, Hector, Patroclus, Nestor, Priamus, Agamemnon, Odysseus, Aeneas, Anchises, Troilus, and one discovered in 1936 which has not yet been named, which verify an important problem solved by Lagrange. This is a particular case of the problem of 3 bodies, which can be stated as follows: if 3 bodies are placed at the angles of an equilateral triangle and move round their common centre of gravity under the influence of

their mutual attractions, then, provided they were originally projected in directions that all make the same angle with the lines joining them to their common centre of gravity, the velocity of projection of each being proportional to its distance from that centre of gravity, they will continually form an equilateral triangle.

Trojan War, see **TROY**, and under **ACHILLES**, **AGAMEMNON**, and **ULYSSES**.

Troll, or **Trold** (old Norse, demon, giant), in Scandinavian folk-lore an ogre (sometimes a gnome) of either sex with evil powers exercised in darkness. T's are represented as berg- or cave-dwellers, whence their appellation, *Bjergfolk*. They are described as living in families, sometimes tribes, and often as possessing kings (cf. Ibsen's *Peer Gynt*, Act. II). Today they have become mere bogies in children's books (cf. Ashbjørnsen and Moe, *Fairy Tales*) and their character has degenerated to that of peasant-life, where some belief continues. In Eng. literature many of the giants (as in Jack and the Beanstalk) and gnomes are descendants of T's in Scandinavian folk-lore, and pixies and malicious fairies are close relations.

Trolley-bus, see **ELECTRIC TRACTION**.

Trollhättan, in the prov. of Elfsborg, Sweden. The falls of Trollhätta, over 100 ft high, afford water power for the surrounding factories. Pop. 27,569.

Trollope, Anthony (1815-82), novelist and civil servant, b. London, fourth son of Thomas Anthony and Frances T. (q.v.). His parents removing to Harrow, Anthony became a day-boy at its school, where he was ill-treated and neglected. Obtaining a clerkship in the Post Office in 1834, he avoided dismissal in 1841 by taking a surveyorship in Ireland, where he acquired his taste for hunting, manifest throughout his stories. T. married in 1844. He pub. his first novel, *The Macdermots of Ballacorney*, in 1847. *The Kellys and the O'Kellys*, 1848, and *La Vendée*, 1850, also belong to this period. Appointed inspector of postal deliveries, T. for 2 years toured England on horseback. He instituted pillar-boxes in 1853. Officially visiting Egypt and the W. Indies, 1858, on his return he pub. *The West Indies and the Spanish Main*, 1859, a book of shrewd comments on the way of life of the people of the is. he visited. He visited the U.S.A. in 1861. Disappointed of an assistant-secretaryship T. left the Post Office in 1867. In 1868 he stood for parliament as a Liberal at Beverley. He visited Australasia, 1871-2, and S. Africa in 1877, writing books about these countries. Meanwhile, through serials pub. in the *Cornhill*, the *Fortnightly*, and the *Pall Mall Gazette*, he had become a popular novelist. Besides domestic interest, he worked 2 veins—eccles. and political. His descriptions are precise and piquant, and his portraits, like his pictures of daily life, are the results of intuition and conjecture, rather than a photographic reproduction of what he saw. Nevertheless, his methods tend to give an impression of average truth. Although but slightly acquainted with the clergy, he made his clerics convincing and, like

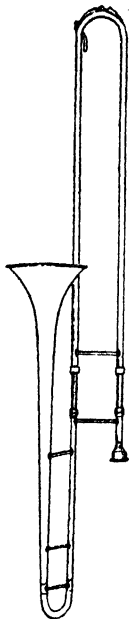
himself, stubbornly Eng. rather than saintly. The bishop's wife, Mrs Proudie (carried, like most of T.'s characters, from book to book), is immortal as a type of domineering vulgarity. The specially eccles., or 'Barchester' series begins with *The Warden*, 1855, and ends with *The Last Chronicle of Barset*, 1867. The other novels in the series were *Barchester Towers*, 1857, *Doctor Thorne*, 1858, *Framley Parsonage*, 1861, and *The Small House at Allington*, 1864. The political interest in T.'s novels begins in *Phineas Finn*, 1869; it tails away with *Is He Popenjoy?*, 1878. T. wrote 47 novels, besides short stories; also left one novel, *The Land-Leaguers*, unfinished when he died. It was pub. in 1883. His *Autobiography*, written in 1875, was pub. in 1883. During the Second World War there was a considerable revival of interest in his work.

See H. James in *Partial Portraits*, 1888; T. H. S. Escott, *Trollope: His Work, Associates, and Literary Originals*, 1913; A. A. Baumann, *The Last Victorians*, 1927; H. Walpole, *Anthony Trollope*, 1928; M. Sadleir, *Trollope: a Bibliography*, 1928, and *Trollope: a Commentary*, 1927; L. P. and R. P. Stebbins, *The Trollopes: A Chronicle of a Writing Family*, 1946; Elizabeth Bowen, *Anthony Trollope: A New Judgment*, 1946.

Trollope, Frances (1780-1863), novelist and travel writer, b. Stapleton, near Bristol, daughter of William Milton. In 1809 she married Thomas A. Trollope and later went with him to the U.S.A. After his death she returned to England and brought herself into prominence with her *Domestic Manners of the Americans*, 1832, an unfavourable and inaccurate account. In all she wrote over 100 vols., her novels including *The Vicar of Wrexhill*, 1837, and *The Widow Barnaby*, 1829. See life by F. E. Trollope, 1895.

Trombone, brass wind instrument, developed from the medieval sackbut, made in 4 sizes apart from some freaks: alto, tenor, bass, and contra-bass, the first of which is now very rarely used, parts written for it being played on the tenor T., while the last hardly ever appears in the orchestra, except in Wagner's *King*. The T.'s most characteristic feature is the slide, by means of which the tube can be adjusted to different lengths in 7 positions, so that all the notes of the chromatic scale can be produced as natural harmonics. The T. was thus a chromatic instrument long before the horn and trumpet became so by the invention of the valves. The intonation, as in string instruments, is not fixed, but depends entirely on the player's ear and skill. Many notes are, of course, available in more than one position (as different harmonics), so that the player often has the choice between an easier and a more difficult way of passing from note to note. A strict *legato* between notes in different positions is not possible, as the breath has to be interrupted during the change of the slide to avoid an unpleasant scoop; but this scoop, usually designated by the hybrid term *glissando*, can be used as a

special effect, though, having been exploited by the music-halls as a comic vulgarity, it rarely appears in serious scores. The range of the tenor T. is from E below the staff in the bass clef to B \flat above middle C, with 2 or 3 possible but dangerous notes higher and 3 pedal notes (B \flat , A and A \flat) below the bass E. The alto T. has the same range a perfect fifth higher, the bass T. an augmented fourth lower, and the contrabass T. an octave lower. In the 19th cent. valve T.s were invented and gained favour in military and brass bands as being easier to play, though even there it is admitted that their tone is inferior to that of the slide T. The valve T. never gained a firm footing in the orchestra.



TENOR
TROMBONE

Tromometer, see SEISMOGRAPH AND SEISMOLOGY.

Tromp, Martin Harpertszoon (1597-1653), Dutch adm., b. Brielle, whose name is associated with the 17th-cent. struggle for the command of the seas between the Dutch and the English. As a boy he went to the E. Indies in a merchant ship, was made prisoner, and passed some years aboard an Eng. cruiser. Escaping to Holland, he entered

the Navy in 1624, becoming lieutenant-adm. in 1637. In Feb. 1639 he destroyed a large Sp. squadron off Gravelines, and in Sept. of the same year defeated the combined fleets of Spain and Portugal off the Eng. coast, capturing 13 richly laden merchantmen. When war broke out with England he sailed to the Downs with a large fleet and anchored off Dover, but was worsted by Blake (19 May 1652), whose fleet was much inferior in numbers. In Nov. he returned with 80 warships and a large convoy of merchantmen. Blake attacked near Dungeness on 30 Nov., but after sustaining severe losses drew off in the darkness and anchored off Dover, sailing next day to the Downs while T. anchored off Boulogne until his convoy had reached safety. The story was that T. sailed up the Channel with a broom at his masthead in of doubtful authenticity. In Feb. of the following year, while again conveying many merchantmen, he kept up a running fight with the combined fleets of Blake, Monck, and Penn off Portland to the Fr. coast near Calais, and had the worst of the encounter, losing 9 warships and 40 merchantmen. On 3 June he fought an indecisive engagement with an Eng. fleet in the Channel, but Blake came up with

reinforcements and so enabled the English to gain the upper hand. T. withdrew to the Texel with the loss of nearly a score of ships. The Dutch then negotiated for peace, but war was soon renewed, and T. again appeared in the Channel towards the end of July 1653, and in a fierce battle with the English under Monck on 29 July T. was shot through the heart. In all he was credited with victories in over 30 encounters. He was buried at Delft, where in the old church there is a monument to his memory. See his *Journal* (ed. and trans. by C. R. Boxer), 1930.

Tromsø, cap. of the co. of Troms, in the N. of Norway, on an is. of the same name. It is the chief port for Spitsbergen, and the seat of a bishop. It is a base for Arctic sealing expeditions and does important trade in fish and fish products. During the Second World War T. was converted into a seaplane base by the Germans. Attacks were made from it on the Allied convoys sailing to Murmansk. The dist. has Lapp settlements, and fishing is carried on. Area of dist., 10,005 sq. m.; pop. (of tn) 11,000; (of co.) 113,200.

Trondheim, city and seaport in Norway, and former cap., lies at the mouth of the Nid, on Trondheim Fjord, 84 m. ENE. of Kristiansund. Third biggest city, co. tn of Sor-Trøndelag, seat of Norway's Univ. College of Technology. Broad thoroughfares pass between rows of wooden houses. Since earliest times the coronation of the Kings of Norway took place in the cathedral, which is one of the most celebrated in Scandinavia. From 1152 T. was the seat of the Archbishopric of Norway, but the importance of T. began to wane after the Reformation. In the Second World War T. fell to the Germans in the spring of 1940 and became an important U-boat base and was frequently bombed by the Allies: the Ger. cruiser *Prinz Eugen* was heavily damaged by an R.A.F. attack while undergoing repairs in T. It was from T. that the mass-resignation movement of Norwegian clergy began, as a protest against the appointment of the collaborator, Quisling, as Prime Minister. T. was liberated by the Allies in May 1945. Pop. 59,400.

Troon, municipal burgh and port of Ayrshire, Scotland, on the Firth of Clyde, opposite Arran. Until the 18th cent. T. was a small fishing hamlet, but the building of a harbour in 1808 made it both port and shipbuilding centre. Today it is a holiday resort and golfing centre. Pop. 10,000.

Troop, originally the unit of cavalry corresponding to the company. A capt.'s command, in the 18th cent. it could be up to 400 strong. It now corresponds to the infantry platoon, and is hence a subaltern's command in armoured regiments. T. is also the traditional unit of horse artillery, and since 1938 has been the sub-unit of other artillery. In field regiments R.A. it constitutes half the 8 guns of a battery and is commanded by a capt. In light anti-aircraft regiments it consists of 6 guns, also commanded by a capt. In anti-tank regiments it consists of 4 guns and is commanded by a subaltern.

Tropaeolum, family Tropaeolaceae, genus of ann. and perennial S. Amer. herbs, of which *T. majus*, Indian Cress or Nasturtium, is a favourite half-hardy climbing annual; and there are many forms and hybrids. *T. speciosum* is the perennial Flame Nasturtium, and *T. peregrinum*, the half-hardy Canary Creeper. *T. polyphyllum* is hardy in Britain, and *T. leptophyllum* and *T. tuberosum* have tubers which may be boiled and eaten.

Trophy (from Gk *tropaion*, and *trepein*, to rout) in classical times a memorial of victory set up at the spot where the enemy had turned.

Tropical Agriculture, Imperial College of, see IMPERIAL COLLEGE OF TROPICAL AGRICULTURE.

Tropical Hygiene, see under HYGIENE.

Tropical Medicine. Owing chiefly to climatic conditions, poverty and the backwardness of the people, many diseases rare or unknown in temperate and colder regions are common in the tropics. The tropical climate favours a great variety of parasites causing serious diseases in man. The parasites are transmitted directly from man to man by food and drinking water contaminated with faeces; by water harbouring parasites discharged from snails; by water containing crustacea infected with parasites or by blood-sucking insects which inoculate parasites when they bite. Other tropical diseases such as beri-beri and pellagra (q.v.) are due to deficiencies in diet and to animal and vegetable poisons. Aet. Egyptian and Indian records show some knowledge of T. M., and the extraction of the guinea-worm (q.v.) was known to Moses; but the scientific study of the subject may be regarded as beginning in the 16th cent., a result of explorations and the estab. of communication between the Old World and the New. This led not only to the discovery, but also to the discrimination, of diseases hitherto unknown to Europeans. The literature of T. M. began during last cent. and has subsequently grown considerably. The microscope made possible the identification of minute parasites and the study of their life histories. It led to the discovery of the causative organisms and transmission of such diseases as malaria (q.v.), sleeping sickness (q.v.), leprosy (q.v.), and amoebic dysentery (q.v.). Results of microscopic research were often fully confirmed by experimental infection of the research workers, sometimes with fatal results. The chief diseases due to Protozoa (q.v.) are malaria, black-water fever (q.v.), black fever (kala-azar), sleeping sickness (trypanosomiasis) (q.v.), and amoebic dysentery. Tsetse flies, carriers of the trypanosomes of sleeping sickness, are confined to Africa, so that African slaves transported to America failed to establish the disease there. Trypanamide injected in the early stages effects a cure, and may even do so in advanced stages; the drug anticholera has recently been introduced for trypanosomiasis of cattle in Africa. No effective treatment is known for S. Amer. trypanosomiasis, carried by bugs.

Quinine and the synthetic mepacrine and paludrine are specific remedies for malaria, and antimony compounds for kala-azar. Relapsing fevers are caused by spirochaetae carried by ticks, lice, and the teeth of rodents. The injection of arsenical compounds is an effective treatment. Typhus fevers are divided into 3 groups according to their transmission by lice, ticks, and mites. Diseases due to filterable viruses are yellow fever (q.v.), and dengue (q.v.), transmitted by mosquitoes, and sandfly fever (q.v.), carried by sandflies (*Phlebotomist*). Plague (q.v.), a pandemic disease discovered by Kitasato and Yersin to be caused by *Bacillus pestis*, is transmitted by rat fleas. Serum has been used for treatment and vaccines for protection. Cholera (q.v.), a water-borne disease, causes serious epidemics with high mortality rate. Treatment consists in maintaining the fluid content of the body by injection of salt solutions, while protection is conferred by vaccines. Leprosy (q.v.), an aet. disease long considered incurable, was discovered by Hansen (1874) to be due to *Mycobacterium leprae*. During the 20th cent., treatment with the derivatives of chaulmoogra, hydrocarpus oil, has been found to effect a cure in the early stages, and in a small percentage of advanced cases; sulphonamide drugs are now being used. Brilliant research has been carried out in connection with the various parasitic worms causing ankylostomiasis, filariasis, guinea-worm, bilharziasis (q.v.), and other diseases. Antimony compounds are specific for bilharziasis, and oil of chenopodium in carbon tetrachloride for ankylostomiasis (hookworm). The antibiotics, which have proved effective against many tropical infections, and the powerful insecticides represent probably the most important of the recent advances in T. M. The resident in the tropics now faces a far better prospect than his predecessor in 1900, while the temporary resident who takes proper precautions can hope to escape infection. If he does not, at least he has every hope of a permanent cure. A similar improvement in the native population must await improvements in education, living standards, and hygiene. Much is being done by W.H.O. to assist various tropical countries in introducing their own health measures. The advance of T. M. has been accomplished by the devotion and sacrifice of workers too numerous to mention. A few of the outstanding names are those of Manson, Ross, Emin Pasha, Laveran, Grassi, Bruce, Reed, Leishman, Eijkmann, and Stanton. There are schools of T. M. associated with the univs. of Liverpool and of London. Two world wars, in which large numbers of British troops were stationed in tropical countries, did much to accelerate research in T. M. See H. H. Scott, *History of Tropical Medicine* (2nd ed.), 1942; Sir L. Rogers and J. W. D. Megaw, *Tropical Medicine* (6th ed.), 1952; Sir P. Manson, *Tropical Diseases* (14th ed.), 1954; J. S. K. Boyd, Chapter 'Fifty Years of Tropical Medicine,' *Fifty Years of Medicine* (B.M.A.), 1950.

See also ANKYLOSTOMIASIS; BILHARZIASIS; BLACK-WATER FEVER; CHOLERA; DENGUE; FILARIASIS; GUINEA-WORM; HYGIENE; LEPROSY; PALUDRINE; PLAGUE; SLEEPING SICKNESS; TSETSE FLY.

Tropical or Equinoctial Year, see YEAR.

Tropics, see CANCER; CAPRICORN.

Tropine, C_8H_9ON , white crystalline solid, m.p. $108^{\circ}C$, obtained by the hydrolysis of the alkaloid atropine (q.v.). It is poisonous, hygroscopic, and optically inactive.

Tropism, name applied in biology to the movements of plants and animals, or parts of them, in response to external stimuli. Thus plant roots will grow towards water (positive *hydrotropism*) and towards the centre of the earth (positive *geotropism*), while plant shoots grow towards the light (positive *heliotropism*) and away from the centre of the earth (negative *geotropism*). Other T.s are *chemotropism* (towards or away from regions of greater concentrations of certain chemical reagents), *galvanotropism* (electrical), *thermotropism* (heat), etc. The T.s are involuntary and automatic.

Tropopause, see STRATOSPHERE; TROPOSPHERE.

Troposphere, the lower part of the atmosphere, extending in temperate regions about 7 m. up from the earth's surface, in which, except for temporary intervals, temp. falls with height. *Tropopause* denotes the upper limit of the T., where it joins the stratosphere (q.v.).

Troppau, see ORAVA.

Trossachs (i.e. bristled ter.), picturesque glen of Scotland, Perthshire, between Lochs Katrine and Achray. This rugged and narrow defile is about $1\frac{1}{2}$ m. in length, and overlooking it are Ben Venue, 2390 ft. and Ben A'an, 1850 ft. It was first made popular by Sir Walter Scott in his *Lady of the Lake*.

Trotsk, see: CHAPAYEVSK; GATCHINA.

Trotsky (real name Bronshteyn), Lev Davidovich (1879-1940), Russian politician of Jewish origin. He joined the Social Democratic movement in 1896, was banished to Siberia, escaped abroad, and joined the Iskra (q.v.) organisation. When the party split in 1903 T. became a Menshevik (see MENSHEVIKS) and strongly denounced Lenin's organisational principles as leading to a one-man dictatorship. He became prominent during the revolution of 1905 (q.v.) as chairman of the St Petersburg Soviet (see SOVIET), was again arrested, banished, and escaped abroad, where he tried to reunite all Russian Social Democratic factions and groups, continuing the struggle against Lenin's dictatorial tactics. During the First World War T., together with Martov (q.v.), led the internationalist wing of the Mensheviks, was expelled from France for pacifist propaganda, and lived in the U.S.A. After the February revolution (q.v.) in 1917 he embarked for Russia, but was detained for sev. weeks by the British at Halifax, N.S. In Russia he joined the Bolsheviks and became Lenin's

chief partner in organising the October revolution (q.v.). As leader of the St Petersburg Soviet and of its Military Revolutionary Committee T. conducted the seizure of power in the capital. In 1917-18 he was commissar for foreign affairs; he represented Soviet Russia at Brest-Litovsk, but was opposed to the conclusion of the treaty and resigned. From 1918 to 1925 he was commissar for war, the chief organiser and leader of the Red Army in the civil war (q.v.). He was a Politburo member 1919-27, and repeatedly opposed Lenin. After Lenin's death T. was ousted from power in Russia and in the world Communist movement by Stalin, Zinov'ev, and Kamenev, but continued to fight back, later joining forces with Zinov'ev and Kamenev in the 'combined opposition' (see LEFT OPPOSITION) until he was expelled from the party in 1927, banished to Central Asia in 1928, and expelled from Russia in 1929. During the Great Purge (q.v.) he was accused of conducting espionage and subversive activities in the Soviet Union on behalf of foreign intelligence services. He was murdered, probably by Stalin's agents, in Mexico City, where he had spent the last years of his life.

Followers of T. still exist in sov. countries as Communist splinter groups, and in Ceylon they form an important political party. His works include *Our Revolution* (N.Y.), 1918, *The Defence of Terrorism*, 1921, *Literature and Revolution*, 1925, *The Real Situation in Russia*, 1928, *My Life*, 1930, *The History of the Russian Revolution* (3 vols.), 1932-3, *The Revolution Betrayed*, 1937, *The Stalin School of Falsification* (N.Y.), 1937, and *Stalin*, 1946. See B. D. Wolfe, *Three Who Made a Revolution* (N.Y.), 1948; I. Deutscher, *The Prophet Armed*, 1954.

Trotsky, Lev, see TROTSKIY.

Trotting, form of horse-racing peculiarly Amer., though a great part of the best trotters in the U.S.A. are descended through *Hambletonian* from the Eng. thoroughbred *Messenger*. The horse is driven in a small trap known as a sulky. The race is run in heats, and a horse must win 3 heats before it can be declared the winner. T. still holds an important place in the U.S.A. The world's record for 1 m. in T. (1 min. 55.1 sec.) was gained by *Greyhound* (against time) at Lexington in Kentucky, 29 Sept. 1938. The fastest pacing m. recorded (1 min. 55 sec.) is that of *Billy Direct* (1938).

Troubadours, class of early poets who appeared in Provence. The etymology of the word is uncertain: Provençal *trobar* means 'to find,' but it is possibly connected with late Lat. *tropare* or *tropium inventre*, to find or invent verses. The T. were inventors of a species of lyrical poetry, characterised by an almost entire devotion to the subject of chivalric love, and generally very complicated in regard to the metre and rhyme.

They fl. from the 11th to the latter part of the 13th cent. principally in the S. of France (but also in Aquitaine, Auvergne, Languedoc), and in Catalonia, Aragon, and N. Italy. The T. spoke the *langue*

d'oc. They were no doubt the natural heirs of the poets of the Latin decadence, for their poetry had its birth and its development exclusively in the countries forming the S. provs. of Rom. Gaul. The distinctive characteristics of their poetry are tenderness, elegance, and flattery; it admirably reflects their wandering life, love of women, and the need to provide for life's necessities. The *trouvères* of N. France, with a more virile style and in a ruder tongue, favoured epics and raised poetry to the level of their character, which is exemplified in their proverbial description as men who held a pen in one hand and a sword in the other. The T., softened by a milder life and a more enervating climate, were contented with the composition of songs alone, and these songs were sometimes notable for their wit, though mainly for their naïveté, and they were almost always marred by want of taste, tedium, and diffuse subtlety. None the less, the intimate life of the whole *midi* breathes through the lyrical or satirical songs of the T. War, religion, and women were the 3 grand sources of their inspiration.

It is generally considered that it was the destruction of the co. of Toulouse that dealt the death-blow to the T. as an institution, for they could then no longer find patrons or protectors of sufficient power to afford them personal security. Some of the most celebrated T. were Bertrand de Born, Geoffroy Rudel, Bernard de Ventadour, Gaucelm Faydit, Arnaud de Marvell, Bertrand de la Tour, Pierre Vidal, Raymonde le Preux, Geoffroy de Luc, Pierre de St Rémy, Boniface, Ogiers, Arnaut Daniel, Giraud de Bornell, Marchebruse, and Sordello. Often T. were of a servile or low condition, but by no means always, for nobles, princes, and even kings either were T. or cultivated the arts of the T., e.g. Frederick Barbarossa, Richard Cœur de Lion, Alphonse II and Pierre III of Aragon, the Marquis de Montferrat, and the Comte de Foix. These gave themselves over to Provençal poetry and vied with the other T. in the courts of love for the prizes accorded to poetry; and out of this rivalry sprang a veritable camaraderie of talent. See H. J. Chaytor, *Troubadours and England*, 1923; J. Anglade (ed.), *Anthologie des Troubadours*, 1927; *Les Troubadours, vies, oeuvres, etc.*, 1929; A. Jeanroy, *Poésie lyrique des troubadours*, 1934, and J. A. Fleming, *Troubadours of Provence*, 1952.

Troubles, Time of, period in Russian hist. (1598-1613) between the extinction of the House of Rurikides and the estab. of the House of Romanov. During this time there were 5 tsars in Moscow whose claims were dubious (including an impostor and a Polish prince), Polish and Swedish invasions, and widespread popular and Cossack unrest. It ended with the expulsion of the Poles from Moscow by patriotic volunteers under K. Minin and Prince Pozharskiy and the election of Tsar Mikhail Romanov.

Tropical, or **Troopial** (*Icterus*), genus of birds with yellow and black plumage.

The common T. or **Brazilian hangnest** (*I. vulgaris*) is a handsome bird which is sometimes kept as a pet; it learns to whistle tunes.

Trousseau, Armand (1801-67), Fr. physician, b. Tours. He studied medicine at Paris and graduated in 1825. He was appointed physician at the Hôpital St Antoine in 1839 and at the Hôtel-Dieu in 1850, in which year he became prof of medicine at the univ. of Paris. He was an outstanding clinician and teacher, one of the leaders of French medicine. He made important advances in the treatment of typhoid, scarlet fever, and other conditions. His important textbook, *Clinique Médicale de l'Hôtel-Dieu*, 1861, containing much of his best work, was trans. into English and German. With H. Belloe he wrote a classical account of tuberculosis of the larynx (1837), and he was the first to perform tracheotomy in Paris, writing a treatise on this subject in 1851.

Trout. The T. is a widely distributed fresh-water fish of the salmon family. Its appearance is unmistakable, although its colouring is extremely variable, ranging from almost black to light olive, according to habitat, with the characteristic black or red spots. The eggs are laid in the gravel of streams, in winter, and hatch 3-4 months later, but the fish may move into lakes at other times. The food is mainly animal, consisting of insects, their larvae, and small fish, the size attained depending almost entirely on the abundance of the food supply; in Britain T. of over 20 lb. have been caught, but the normal size is below 1 lb. It is considered at present that the native T. is one species (*Salmo trutta*), of which the *sea trout*, which feeds at sea and ascends rivs. to spawn is a particular variety. This fish, broadly speaking, resembles a salmon in appearance, and has a similar life cycle, descending to the sea at 2-4 years of age, and returning to spawn annually when adult. The term 'Bull trout' is applied locally to old T., sea T., and also to salmon which have spawned in the past; there is no evidence of a distinct variety to which the name could be strictly applied, and its use leads to confusion.

The T. is prized for its culinary and sporting qualities, and is commercially bred and reared (see **PISCICULTURE**) to stock streams. The Rainbow T. (*S. irideus*), an Amer. introduction, is more commonly reared for the table, as it grows faster, but it does not establish itself when used for stocking waters in Great Britain. The life hist. of salmon and T. can conveniently be determined by microscopic examination of their scales; age, growth rate, and spawning hist. can be determined, which greatly assists the proper management of waters.

Trouvères, see **TROUBADOURS**.

Trouville (-sur-Mer), Fr. seaside resort in the dept. of Calvados. It is linked by a bridge across the R. Touques with the more exclusive Deauville (q.v.). It has a good beach and a casino, and is the most popular resort on the Eng. Channel. It

has a fishing trade, and there is some commercial traffic in the port. Pop. 7600.

Trover, or **Trover and Conversion**, in law, the name of an old form of action which lay against anyone who converted or appropriated to his own use any personal property, in which the plaintiff had either a general property as owner or a special property as bailee. Since the Common Law Procedure Act, 1852, which practically abolished the old common law forms of action, the substance only and not the form of the action has survived.

Trowbridge, mkt. and manufacturing tn of Wilts, England, famous for its W. of England cloths. About 1530 Leland described T. as 'flourishing by drapery,' but since then other industries have developed, including light engineering, brewing, manufs. of bedding, bacon curing, creameries, etc. Many of the fine stone houses of the 18th and early 19th cents. remain. T. is mentioned in Domesday Book; the par. church of St James dates from the 14th cent., and here George Crabbe, the poet, was rector. T. was the bp. of Sir Isaac Pitman (q.v.). It is the centre of co. administration. Pop. 14,000.

Troxidone, drug for the treatment of epilepsy (q.v.). Good results have been claimed for it in that variety of epilepsy known as *petit mal*; for *grand mal* phenobarbitone and related substances are preferred. The use of T. involves certain risks, such as the development of skin rashes and disorders of vision, and its administration should therefore be medically supervised. See *British Med. Jour.* vol. 2, p. 325, 1949.

Troy, Jean François de (1679-1752), Fr. painter, b. Paris. He was the most famous of a family of Fr. painters, and studied in his father's school. He excelled in delicate miniatures and in historical tableaux. He also erected a monument to Gobelin.

Troy, Ilium, or The Troad, famous city and dist. of Asia Minor, forming the NW. of Mysia. The dist., usually known as 'The Troad,' was bounded W. and NW. by the Aegean and the Hellespont, E. by a ridge of Mt Ida, S. by the Gulf of Adramyttium, its coast-line extending from Lectum promontory (S.) to the R. Rhodius (N.) below Abydos. The greatest length of the Troad from NW. at Cape Sigeum (now Yenî Shehr) to the SW. at the Lectum promontory (Baba Kale) is about 40 m., and the breadth about the same. The central part is drained by the Menderes, anct Scamander, which rises in Ida and reaches the Hellespont E. of Cape Sigeum. There are pine forests on Mt Ida and, in the plains, willow, cypress, tamarisk, valonia, oak, etc. The vine is cultivated, together with wheat and maize. Even in anct times it was fertile and populous, while under Turkish rule its fertility alleviated the poverty of its inhab.

In classic legend the earliest king of this country was Teucer, after whom the Trojans are called Teucri or Teucrans. His daughter married Dardanus, a neighbouring chieftain, hence Dardanidae (sons

of Dardanus) is another name for Trojans. They were probably a Pelasgian race, possibly descended from Thracian emigrants. Dardanus was grandfather of Troes, whose son Ilius founded Ilium or the city of Troy, the largest and strongest settlement in The Troad. The next king of T. was Laomedon, who was succeeded by his son Priam, in whose reign the famous siege of T. by the Greeks took place, to avenge the rape of Helen, wife of Menelaus of Sparta, by Priam's son Paris. This siege lasted nearly 10 years, and ended with the sack and capture of T. by a stratagem of the Greeks (c. 1184 bc). The story is told in Homer's *Iliad*, and part in Virgil's *Aeneid*, ii. Once considered purely legendary, it is now commonly regarded as historical in the main outlines, the rape of Helen, perhaps, representing some act of piracy. Among the chief Gk heroes of the siege were Achilles, Agamemnon, Menelaus, and Odysseus; and among the Trojans, Hector, Paris, and Aeneas. A small city on the site in Alexander's day was in ruins by Strabo's time. The site of the anct T. is marked by the Hissarlik mound. The explorations carried on here by Schliemann (1870-90) and Dörpfeld (1893-4) brought to light much valuable information. Remains of some 9 different cities were discovered, buried one beneath another, the earliest dating from about 3000 to 2560 bc. Probably the beginning of the seventh phase in the hist. of the city was the Homeric T. There are traces of 2 Gk settlements (1000-1st cent. bc), and of a new Ilium (1st cent. bc-ad 500). See *Herodotus*, v. 95, vii. 75; *Strabo*, xiii; J. B. Lechevalier, *Voyage de la Troade*, 1802; H. Schliemann, *Ilios*, 1880, and *Troja*, 1883; C. W. Blegen, 'Excavations at Troy' in the *American Journal of Archaeology*, 1932-9.

Troy, co. seat of Rensselaer co., New York, U.S.A., on Hudson R., a port and a commercial and industrial centre. Shirts, collars, and cuffs are among the chief manufs., and it also produces other clothing, machinery, fire hydrants, brushes, abrasives, and aircraft and auto parts. It is the seat of Rensselaer Polytechnic Institute and the Russell Sage College. Pop. 72,300.

Troy Weight, see METROLOGY.

Troyes, Fr. tn, cap. of the dept of Aube, on the Seine. Once the settlement of the Tricassi, it became in the Middle Ages the cap. of Champagne (q.v.). A treaty signed here in 1420 between Henry V of England and Charles VI (qq.v.) recognised Henry as heir to the Fr. throne. The tn has sev. Gothic churches, including a beautiful cathedral, and many anct houses. It was probably the bp. of Chrétien de Troyes (q.v.). It has an agric. mkt., textile industries, and manufs. machinery and foodstuffs. Pop. 58,800. (See also TROY WEIGHT.)

Troyon, Constant (1810-65), Fr. painter, b. Sévres. He was an accomplished colourist and excelled as a painter of cattle. He is associated with the painters of the Barbizon school. There are pictures by him in the Louvre, the

Wallace Collection, and the Glasgow Art Galleries. See life by A. Hustin, 1893; W. Gensel, *Corot et Troyon*, 1901.

Trat, see TRIESTE.

Trubetskoy, the name of 3 Russian philosophers from an old aristocratic family:

1. *Sergey Nikolayevich, Prince* (1862–1905), prof. and rector of Moscow Univ., editor of the chief philosophical jour. in pre-1917 Russia, *Problems of Philosophy and Psychology*. In his historical (*Metaphysics in Ancient Greece*, 1890, *The Doctrine of Logos in its History*, 1900) and systematic works (*On the Nature of Human Consciousness*, 1891, *The Foundations of Idealism*, 1896, *Belief in Immortality*, 1908) he endeavoured to combine Hegelian rationalistic Idealism with the mysticism of Solov'ev (q.v.). He was active in the constitutional movement before the Revolution of 1905 (q.v.), and became famous for his address to Nicholas II as spokesman of a Zemstvo (q.v.) and municipal deputation.

2. *Yevgeniy Nikolayevich* (1863–1920), brother of the above; legal philosopher (a follower of Solov'ev) and liberal politician. He was prof. at Kiev, then at Moscow Univ., and editor of *Moscow Weekly*. His chief works are *Religious and Social Ideal of Western Christianity in the Fifth Century*, *St Augustine*, 1892, *Religious and Social Ideal of Western Christianity in the Eleventh Century*, *Gregory VII and his Contemporaries*, 1897, *The Philosophy of Nietzsche*, 1904, *The Philosophy of V. I. Solov'ev* (2 vols.), 1913, *Lectures on the Encyclopaedia of Law*, 1916, *The Metaphysical Assumptions of Knowledge*, 1917, and *The Meaning of Life*, 1918.

3. *Nikolay Sergeyevich* (1890–1938), son of Sergey; philologist and philosopher. He was prof. at Vienna Univ., 1923, studied Slavonic, Finnish, and Caucasian languages, and created a new branch of linguistics—phonology, the science of vocal sounds (*Principes de Phonologie* (Paris), 1949). During 1921–8 he was one of the leaders of the Eurasians (q.v.), and his *To the Problem of Russian Self-Knowledge*, 1927, defines his views on the Asiatic factors in Russian culture and origins. See N. O. Lossky, *History of Russian Philosophy*, 1952; V. V. Zenkovsky, *A History of Russian Philosophy* (vol. 2), 1953.

Trübner, Wilhelm (1851–1917), German landscape and portrait painter, b. Heidelberg, where he was pupil of A. Feuerbach. He studied at Karlsruhe and Stuttgart; and later at Munich under Leibl, when he was strongly influenced by the Impressionists. T. was prof. at Frankfurt-on-the-Main, 1898–1903, and at Karlsruhe from 1905. There are frescoes in Heidelberg in hall, and pictures throughout Germany. His wife Sophie was also a painter. See study by H. Rosenhagen, 1909; W. Hansenstein, *Meißler und Werke*, 1930.

Trust of God, see GOD'S TRUCE.

Truck Acts. The object of the T. A. are: (1) to ensure the payment in coin of wages in hiring contracts, and (2) to

render illegal any provision in a contract for the payment of wages otherwise than in current coin. Historically the T. A. had their origin in 15th-cent. enactments framed to put an end to the practice of defrauding workmen and labourers by paying them in goods of a poor quality or by making unreasonable and excessive deductions from their wages. The Act of 1831 makes it a misdemeanour to make payment by delivery of goods; and by the combined operations of that Act and the Act of 1887 it is illegal for an employer to make any deduction or set-off for goods supplied, either by himself or through any agent of his; and, further, contracts which attempt to specify the place or manner in which wages are to be expended are null and void. The Act of 1896 punishes employers who make contracts with workmen for any deductions from wages by way of fines, unless: (1) the terms of the contract are contained in a notice kept constantly posted up in some conspicuous place; and (2) the contract is in writing and signed by the workman, and specifies the acts or omissions in respect of which fines may be imposed, and the amount of such fines. In any event fines can be imposed only for acts or omissions likely to cause damage or loss to the employer, or 'an interruption or hindrance to his business.' There are similar provisions in the Coal and Metalliferous Mines Regulation Acts. The prin. exemptions from the T. A., apart from those impliedly stated above, are: (1) deductions (under written contracts) in respect of materials and tools to miners, fuel, provender for beasts in business, rent, and medical attendance; and (2) deductions for advances by way of contributions to benefit societies or for education of children (including, of course, payments under the National Insurance Acts). The T. Act, 1940, was passed in consequence of the House of Lords' decision of that year in *Pratt v. Cook, Sons and Co. (St Paul's Ltd.)*, where an artificer had been employed for wages plus meals prepared on the employers' premises, there being no written agreement signed by the employee. The court decided that the contract and payments made otherwise than in current coin were illegal and void and that the employee could recover so much of his wages as had not been paid in cash for a period not exceeding 20 years. The Act of 1940 restrains legal proceedings under the T. A. in respect of transactions which, like the above, might lawfully have been effected in another form. Currency notes and bank-notes for £1 and 10s. are equivalent to cash, and may be, and of course are, given in payment of wages, notwithstanding the provisions of the T. A., 1831, which, as a general principle, requires payment to be made in current coin of the realm (Currency and Bank Notes Acts 1914 and 1928). See H. S. G. Halsbury, *Laws of England*, vol. 14; A. S. Diamond, *Law of Master and Servant* (2nd ed.), 1946 (supplement 1952); M. Cooper, *Outlines of Industrial Law*, 1954; S. Stone, *Justices' Manual* (ann.).

'Truculent,' Brit. submarine of the 'T' class patrol submarines of the war construction programme, completed in 1942, of just over 1000 tons. On 12 Jan. 1950, in the vicinity of the W. Oaze buoy, Thames estuary, at 7.4 p.m., she collided in 9 fathoms of water with the 643-ton Swedish tanker, *Divina*, with the loss of 64 men, there being 80 aboard (6 officers, 56 ratings, and 18 dockyard workers). The *Divina* rescued 10 men.

Trudelin, see FRIDOLIN, ST.

Truffles, underground fungi. The Brit. *T. (Tuber oestivum)* is found just below the surface in beech and oak plantations in the autumn. When mature it is hard and black and warted externally. Inside it is mottled with white and yellowish brown. The *T.* used in France is *T. melanosporum*, and the garlic-scented *T.* of Italy is *T. marginatum*.

Trujillo: 1. Sp. tn in the prov. of Cáceres. It is partly walled, has a Moorish castle, and has many fine anct mansions. Pizarro (q.v.) was b. and is buried here. *T.* is the centre of an agric. dist. Pop. 15,000.

2. Seaport of Honduras on a bay of the same name, opposite Roatán is., on the Caribbean coast. It is the cap. of Colón dept. Live-stock are reared, and there is some tropical agriculture. Pop. 3000.

3. Third largest city in Peru, cap. of dept of La Libertad, with ruins of the anct Indian city of Chan Chan on the outskirts. Cocoa is grown in the dist. or oases of *T.* The dist. is occupied predominantly by large estates devoted to the cultivation of sugar cane, and the 2 oases of *T.* produce 56 per cent of Peruvian sugar. It is also an important communications centre by air, rail, and road. It is a univ. tn and the seat of a bishop. Pop. 47,730.

4. State and its cap. in Venezuela. The to stands at an altitude of 2700 ft on the Bolivarian Highway. It produces coffee, cacao, sugar, Indian corn, and tobacco. Part of the Lake Maracaibo petroleum area is in the state. Area 2856 sq. m.; pop (of tn) 12,000; (of state) 284,000.

Truman, Harry S. (1884-), thirty-third president of the U.S.A., b. in Lamar, Barton co., Missouri, of Scottish and Eng. descent. He was educ. at the high school, Independence, Missouri. From 1900 to 1905 *T.* held small commercial posts, and for the next 12 years farmed his parents' land near Independence. Soon after the U.S.A. entered the First World War, *T.* joined the Army and served with distinction in France. In 1922 *T.* was elected judge of the Jackson co. court, a body concerned with the supervision of the co. administration. In 1934 he was elected a senator for Missouri in the Democratic interest and re-elected in 1940. The following year he turned his attention to the spending of public money in war contracts, and he was instrumental in the formation of a Senate committee, of which he became chairman. When President Roosevelt was nominated for a fourth term in July 1944 the Democratic Convention's choice of *T.* as vice-president was acceptable to both the liberal and left-wing groups and to the

more conservative elements. The value of avoiding a change of leadership at that particular juncture of world affairs—a value which *T.* himself recognised—was destroyed by the death of Roosevelt on 12 April 1945. *T.* succeeded to the presidency after having been in office as vice-president only 83 days.



U.S. Information Service: American Embassy

HARRY S. TRUMAN

On 16 April *T.* as president addressed Congress for the first time, stating he would follow Roosevelt's policy at home and abroad. The war in Europe ended on 8 May and in July *T.* was in Berlin, taking part in the Potsdam Conference (q.v.). It then fell to him to announce to the world the fact of the existence of the atom bomb and to authorise its use against Japan.

In general, *T.* had the support of Congress, on which he relied for the passage of his legislative programme, but only a small part of it was passed by the end of 1945, including principally Amer. participation in the Bretton Woods Agreements (q.v.) and in the U.N. Organisation. Actions which were criticised were the cancellation, with some exception, of all outstanding contracts under lend-lease, and the removal of price-control and rationing. Throughout 1946 *T.* was faced with severe labour troubles against which he took energetic action, but he showed his sympathies towards labour by vetoing the strike control bill, which Congress eventually passed. On foreign affairs he paved the way for the U.S.A. to take up its position of leadership among

the democratic countries, and in this T. made his greatest contribution to post-war statesmanship. When the Eightieth Congress assembled in Jan. 1947 with a Republican majority, hostile to T., he reaffirmed the end of isolationism and declared that America must continue to shoulder its responsibilities to the world. Addressing Congress again on 12 March, he made a notable speech, calling for aid to Greece and Turkey and initiating what later came to be known as the 'Truman doctrine,' the policy for helping countries threatened by, and anxious to resist, Communism. Later in the same year he supported his secretary of state, Gen. Marshall, in the plan to aid Europe, and the following year launched the Economic Co-operation Administration (see ORGANISATION FOR EUROPEAN ECONOMIC CO-OPERATION). In the presidential elections of 1948, T. based his campaign on the failure of Congress, controlled by the Republicans, either to carry his anti-inflationary legislation or to check the rising cost of living. T. was confident of success at the polls, but all forecasts were against him. In the event 24,105,812 votes were cast for him and 21,970,065 for his nearest rival, Dewey (q.v.). He carried 28 states, giving him 303 electoral votes against 189 for Dewey. T.'s reelection as president was a great and unexpected personal triumph for T., and in his message to Congress in Jan. 1949 he proposed to put into effect his 'Fair Deal' policy of increased social security combined with measures to keep down prices. In his inaugural address as president for his second term he promised Amer. participation in the security arrangements of the N. Atlantic. Shortly afterwards the Atlantic Pact was negotiated, and T. was present at the ceremony in Washington on 4 April 1949, when the treaty was signed by the foreign ministers of the 12 nations concerned. He consistently realised the responsibilities of the U.S.A. in international affairs, and gave effect to this both in the Atlantic Pact and in his economic policy. On 27 June 1950, immediately following the invasion of the S. Korean rep., he announced the armed intervention of the U.S.A. (see UNITED NATIONS CHARTER; UNITED STATES, History). In domestic politics his success rested largely on his great ability as an administrator, his adherence to constitutional procedure, and his powers of quick decision. In Nov. 1950 an unsuccessful attempt was made on T.'s life by Puerto Rican fanatics. T.'s second term ended somewhat stormily. There was disillusion because the Korean peace talks had so far produced no result; and a vociferous Right Wing Republican wave of criticism of T.'s conduct over the MacArthur dismissal, and of the Democratic administration's treatment of Communists generally. T. announced that he would not stand for the presidency again, although he was personally exempt from the 22nd amendment to the Constitution, adopted 1951, limiting his successors to 2 terms of office only. In 1956, however, he emerged from what

had amounted to political retirement in an attempt to secure the nomination of Harriman (q.v.) as Democratic presidential candidate; but in spite of his efforts, the nomination went to Stevenson (q.v.). See his *Memoirs*, 2 vols., 1955, 1956.

Trumbull, John (1750-1831), Amer. poet, b. Westbury, Connecticut. Educ. at Yale, he studied law and became a judge. Most important of the group known as the Hartford Wits, he advocated departure from the prevailing neo-classical style of poetry, but nevertheless often followed it himself. In 1773 he pub. *The Progress of Dulness*, a burlesque, and *The Correspondent*, a series of satirical essays. His mock-epic *McFingal*, 1775, modelled on *Hudibras*, satirised the British. See A. Cowie, *John Trumbull: Connecticut Wit*, 1936.

Trumbull, John (1756-1843), Amer. painter, son of Jonathan T., lived alternately in his native country and England, where he studied under Benjamin West. He is pre-eminently the artist-historian of the War of Independence, in which for a time he served as aide-de-camp to Washington, whose portrait he painted. The largest single collection of his pictures is in the possession of Yale College, but 'The Signing of the Declaration of Independence' and 3 other large pictures are at the Capitol at Washington.

Trumbull, Jonathan (1710-85), Amer. revolutionary, b. Lebanon, Connecticut, rose to become governor of his native state. During the Amer. Revolution he had considerable influence on Washington, who referred to him always as 'Brother Jonathan.'

Trumper, Victor Thomas (1877-1915), Australian cricketer, b. Sydney, New S. Wales. He played for New S. Wales and represented Australia 48 times; toured England in 1899, 1902, 1905, and 1909. T. was a brilliant and graceful batsman with an ability to make big scores by unorthodox methods on treacherous wickets. Thus he was at his best in the wet Eng. summer of 1902, when he scored 2570 runs. His best score against England was 185 not out, 1903-4; against Sussex in 1899 he made 300 not out. He was in fine form against the S. Africans in 1910-11, when he made his highest test score, 214 not out at Adelaide. In 1913-14, for an Australian XI v. Canterbury, he and (Sir) Arthur Sims estab. the world record 8th-wicket partnership of 433.

Trumpet. A brass wind instrument tracing its descent through the bugle to the Rom. lituus or tuba. It consists of a long narrow brass or silver tube, bent twice on itself, so that 2 of the parallel branches form with the third a kind of rectangle with rounded corners. The mouthpiece is cup-shaped, and the other extremity broadens out like a convolvulus. Until the invention of the valves in the 19th cent. the T. was capable of producing only the natural harmonic notes, for which reason, combined with that of its incisive and carrying tone, it was found useful for fanfares, and for military purposes was

often combined with kettledrums, a practice clearly reflected in the scores of classical orchestral works up to the early 19th cent. The valves made the T. a chromatic instrument, first made in the pitch of F, transposing a perfect 4th up. The T.s in modern use, however, are usually in B \flat or A, transposing a major 2nd or a minor 3rd down, respectively, the written compass being from F \sharp below middle C to C above the staff in the treble clef, sounding respectively K-B \flat and D-A. There are also T.s in C, and the T. in F is still in use.

Trumpet Flower, or **Cross-Vine**, alternative names for the *Bignonia* (q.v.).

Trumpet Marine, a one-stringed musical instrument of the monochord (q.v.) type, quite unconnected with the trumpet, except by its sound, obsolete since the 18th cent. and never of great artistic value. It was used mainly to maintain pitch among singers in church and in convents, hence the Ger. name *Nonnen-geige* (nuns' fiddle). Another Ger. name was *Trummachtel*, and the It. and Fr. names were *tromba marina* and *trompette marine*. The adj. 'marine' has never been satisfactorily explained.

Trumpeter, or *Psophia*, genus of S. Amer. birds allied to the cranes. *P. crepitans* is a bird of lustrous and brilliantly coloured plumage and is often domesticated.

Truro, city and municipal bor. of Cornwall, England, on the R. Truro, a branch of the Fal, 9 m. N. of Falmouth and 279 m. from London. It is an anct tn, the *Treuru* of Domesday Book. The old bor. was comprised in the parish of S. Mary on land at the junction of the Allen and Kenwyn Rls., but even in Tudor times the township had grown beyond these narrow limits. Leland (c. 1535) mentions 'Kenwyn Strete' and 'Clementes Strete,' suburbs of T. They were not formally incorporated until 1835. The Allen is still a noticeable feature with its 3 bridges. Kenwyn R. runs underground through the centre of the city, but the higher portion, with the 'Leates,' forms an attractive walk to the Victoria Gardens. Lemon Street (c. 1795), named after an 18th-cent. merchant, is a splendidly planned street familiar under the name of 'Orange Street' to readers of Hugh Walpole's novels. In Prince's Street, named after the Regent, is the house of W. Lemon, the massive mahogany woodwork of which attests the magnificence of former days. Here, too, was born Henry Martyn (q.v.), the missionary philologist, commemorated in the Cathedral by the baptistery. Near by is the site of the old Coinage Hall, where for 500 years until 1837 royal officials came to examine the smelted tin and where the Tinnerns' Parliament held its often stormy gatherings, and also where Wesley preached. The whole city is dominated by the cathedral, whose central tower is 250 ft high. The anct diocese was re-estab. in 1876, and the cathedral was the first erected in Britain since the rebuilding of St Paul's in the reign of Charles II. The foundation stone was laid on 20 May 1880, by the

Duke of Cornwall (later Edward VII). In 1903 the nave was added and the Central Tower in 1904. In 1910 the Western Towers, named after Edward VII and Queen Alexandra, were dedicated. The Co. Museum and Art Gallery contains many paintings by John Opie (1761-1807) and by modern Cornish artists. Near the museum is the site of the Dominican Friary, of which the church was dedicated in 1259. The cattle market, the most important in the co., was built in 1840 on the site of T. Castle. This was the anct Truro, but even in Leland's time it was 'now clene down' and the site 'used for a shoting and playing.' Although T. cannot be described as an industrial tn, there are some important works: gingerbread, sweets, pottery, pitchers, knitted goods, electrical goods, and motor-car bodies. Notable schools are the high school for girls founded in 1880 by Bishop Benson; the Cathedral School for boys founded in 1549 or earlier, as the Truro grammar school; and, on a hill above the cathedral and city, the Truro School founded in 1879, and now administered by a Board of Governors mainly appointed by the Methodist Conference. Pop. 13,350.

2. Cap. of Colchester co., Nova Scotia, Canada, an important junction of the Canadian National Railways. It is an industrial centre, noted for hats, caps, hosiery, textiles, milk products, and lies in the heart of an agric. area. It has the Provincial Agric. College and the Nova Scotia Normal College for training teachers. Pop. 10,760.

Truss, see under **HERNIA**.

Trust (Commercial). T. is the term somewhat loosely applied in the business world to a large financial and industrial combination of firms 'federated' for common policies on price, output, etc., but otherwise independent in domestic matters. The aim of T.s is partly monopolistic. In essence they are really the union of separate corporations or companies trading in the same or similar commodities. The shareholders of the separate companies taking part in the union surrender their holdings to a board of trustees, and in return for such surrender receive a T. certificate setting forth the value of their holding in the T. The trustees now virtually become a board of directors controlling and directing the different members of the T. as one single whole. By such arrangements competition can be eliminated, overhead charges reduced to a minimum, expenses of production and distribution curtailed. If there were no other factors operating, the public would stand to gain in the long run. But too often, when competition has been eliminated, the T. is more concerned in increasing profits than in passing on to the public the benefits of successful trading. There is a limit to which prices may be raised through T.s, as rival concerns would not be long in establishing themselves. The first of these modern T.s was that estab. in the U.S.A. by John D. Rockefeller (q.v.) in 1882: the Standard Oil Trust, with a capital of \$100m. This T. at its inception was able to control

85 per cent of the total output of refined petroleum in the U.S.A. In 1911 the U.S. Supreme Court ordered its disintegration. In the U.S.A. Ts are regarded as a potential danger to the community. Laws have been passed by Congress, including the Sherman Anti-Trust Act of 1890, and different states in the Union declaring them illegal and forbidding their promotion. They could also be investigated under British anti-monopoly legislation if they control a third or more of the output or supply of a commodity. See also CARTEL; COMBINE; CAPITAL AND CAPITALISM; *History of Capitalism*; MONOPOLIES; TAFT, WILLIAM HOWARD.

Trust Companies, see TRUSTS (COMMERCIAL).

Trust investments, are regulated by the Will or Settlement, and by the consolidating Trustee Act, 1925 (Part I). A trustee may invest any trust funds in his hands, whether at the time in a state of investment or not, in any of a number of investments specified in section 1 of the Act. These include: parl. stocks or public funds, or gov. securities in the U.K.; real or heritable securities in the U.K., including the security of a charge on freehold land by way of legal mortgage; stock of the Bank of England or the Bank of Ireland (all Bank of England stock has been transferred to the Treasury pursuant to section 1 of the Bank of England Act, 1946. The Bank of Ireland stock is retained in the Act, but stocks of the Republic of Ireland are excluded); India 7%, 5½%, 4½%, 3½%, and 2½% stock (but reference should be made to the Gov. of India Act, 1935, section 165, and to the India Independence Act, 1947, section 18, as to the interpretation of pre-existing law); securities the interest of which is for the time being guaranteed by Parliament (including, under an Act of 1945, the Parliament of N. Ireland); consolidated stock created by the Metropolitan Board of Works, or by the L.C.C., or debenture stock created by the Receiver for the Metropolitan Police Dist., or Metropolitan Water stock; the debentures or preference stock of any railway company in the U.K. incorporated by special Act of Parliament and having during the previous 10 years paid a dividend at the rate of not less than 3 per cent on its ordinary stock (under the Transport Act, 1947, provision is made for the replacement of securities of railway companies by Brit. Transport stock); debenture stock and 'B' annuities of Indian railways (subject to the effect of the India Independence Act, 1947); debentures, or guaranteed or preference stock of any company in the U.K., estab. for the supply of water and incorporated by special Act or Royal Charter and having paid a dividend of 5 per cent for the last 10 years; inscribed stock issued by any municipal bor. having a pop. of over 50,000, or by any co. council; municipal stocks issued under Act of Parliament or provisional order; and stocks authorised under the Colonial Stock Act, 1900. Trustees may also

invest in any security issued under the National Loans Acts, 1939-45, and section 1 of the Miscellaneous Financial Provisions Act, 1946. Securities created and issued to raise money under section 12 (4) of the New Towns Act, 1946 or under section 86 (3) of the Town and Country Planning Act, 1947, are to be deemed for all purposes to have been created and issued under the National Loans Act, 1939, and are, accordingly, trustee securities. Trustees, unless expressly prohibited from so doing, may invest in bearer securities which if they were not payable to bearer would have been authorised securities. Most modern wills and settlements allow of a wider range than either the Act of 1925 or the Rules of Court, and so long as the trustee keeps within that range and acts in good faith he is protected. The investments authorised by the High Court are those stated in the Rules of the Supreme Court (Order 22, rule 17). They only require of the stocks named in section 1 (1) (9) of the Act that a dividend shall have been paid on ordinary stock or shares for 10 years before the date of investment. It should be noted that even when the Will or Settlement contains a list of authorised investments, the trustees may also invest in the securities authorised by the Trustee Act, 1925, unless expressly forbidden to do so (*Re Warren, Public Trustee v. Warren*, 1939); and further, that when specific investments are settled there is no power to realise the same and invest the proceeds in investments authorised by the Act (*Re Pretti, Barrow v. McCarthy*, 1943). Trustees who have held land on trust for sale may invest the proceeds in the purchase of land so long as such proceeds remain identifiable (*Re Wellsted's Will Trusts, Wellsted v. Hanson*, 1949).

Trustee Savings Banks, see SAVINGS BANKS.

Trusteeship Council, council of the United Nations (U.N.), provided for under the Charter of the U.N. to safeguard the interests of the inhab. of ters. which are not yet fully self-governing and which may be placed under it by individual trusteeship agreements. Its estab. was ensured on 14 Dec. 1946, after the General Assembly of the U.N. had approved 8 trusteeship agreements submitted by the administering nations (in brackets): *New Guinea* (Australia); *Ruanda-Urundi* (Belgium); *French Cameroons* and *French Togoland* (France); *Western Samoa* (New Zealand); *British Cameroons*, *British Togoland*, and *Tanganyika* (U.K.); a ninth agreement was afterward approved concerning *Nauru* (admin. by Australia on behalf of herself, New Zealand, and the U.K.). Another agreement for a 'strategic area' was submitted, and approved by the Security Council in Apr. 1947. It concerned the former Jap. mandated is., *Marshall*, *Marianas*, and *Caroline*s. The T. C. consists of members administering trust ters.; permanent members of the Security Council that are not administering trust ters.: China, U.S.S.R.; and as many other members elected for 3-year

terms by the General Assembly, to ensure that the total number of the T. C. is equally divided between those members of the U.N. which administer trust ters. and those which do not. The responsibility for exercising the functions of the U.N. respecting trusteeship in ters. not classed as 'strategic areas' are vested in the General Assembly; for 'strategic areas' in the Security Council. The functions of the T. C. are to consider reports from the administering authorities; to accept and examine petitions; to make periodic inspection visits; and to check conditions in the ters. with an ann. questionnaire on the political, economic, social, and educational advancement of the inhab. Decisions of the Council are made by a majority of the members, each having 1 vote. In addition to the Trusteeship System, the Charter of the U.N. contains a declaration in which those members of the U.N. which administer or may in the future administer non-self-governing ters. recognise the principle that the interests of the inhab. of these ters. are paramount. Periodic visiting missions have been sent out to ters., including to E. Africa in 1948 and 1951; and to W. Africa in 1949 and 1952; and to the Pacific trust ters. in 1950 and 1953.

Trusts and Trustees. *Legal.* A trust is an 'equitable obligation binding a person (who is called a trustee) to deal with property over which he has control (which is called the trust property) for the benefit of persons (who are called the beneficiaries) of whom he may himself be one, and any one of whom may enforce the obligation.'—(Underhill on *Trusts and Trustees*.) Legal historians for the most part trace the development of trusts in Eng. law through the doctrine of *uses*. In all probability the Chancery lawyers, who were ever indebted to the principles of civil law, borrowed the whole idea direct from the Rom. *fidei commissum* (q.v.). Equitable estates (*see ESTATE*) are not now ignored or challenged by the common law (*see EQUITY*), but in construing a trust or considering the powers or duties of trustee and beneficiary respectively it is necessary to observe that the trustee usually has the *legal* ownership of the trust property, subject, of course, to his fiduciary obligations; while the beneficiary has only the *equitable* ownership, though such ownership confers upon him the beneficial right to the income or other profits accruing from the property. Any act or default on the part of a trustee which is unauthorised either by the terms of the instrument creating the trust or by law is called a breach of trust, in respect of which the beneficiary is entitled to sue for damages. The Trustee Act, 1925, which consolidates certain of the previous statutes relating to trustees, re-enacts the statutory provision of the Judicial Trustee Act, 1896, whereby the court can exonerate a trustee who has committed a breach of trust but has acted honestly and reasonably (Section 29). The appointment of a Public Trustee may be made either by the creator of the trust, by the person having by

the Trustee Acts or by the trust instrument power to appoint new or additional trustees when required, or by the court. The Public Trustee is forbidden by the Public Trustee Act, 1906, to accept the responsibility of certain trusts; e.g. trusts exclusively for religious or charitable purposes, trusts for the benefit of creditors, and trusts involving the management of a business. Where there are no trustees available for the purpose of vesting in them land which requires a legal owner under a Settlement, the court may, under the Law of Property Acts, vest the land in the Public Trustee on the statutory trusts, in which case the Public Trustee may not charge fees or act unless requested to do so. Trusts are said to be: (a) *Express*, when created intentionally by the act of the settlor. Express trusts are generally created by deed or will. They are the common means whereby owners of property provide for their issue on their own death or settle property on the children at marriage. (b) *Constructive*, when, though the legal title to property is in one person, the court will decree that he ought in equity to hold the property subject to the beneficial enjoyment of another. (*See CONTRACTS, and FRAUDS, STATUTE OF*.) All property, real (q.v.) or personal, whether situate at home or abroad, and whether in possession or in action (*see CHOSE IN ACTION*), remainder (*see LAND LAWS*), reversion (q.v.), or expectancy, may be made the subject of a trust, unless the law has made it inalienable (e.g. pensions and salaries to public servants), or being land the tenure (*see TENURE*) is inconsistent with the trusts sought to be created. The expressed object of the trust must be lawful or it will be held void; hence trusts conducive to immorality or fraud, trusts restricting the power of alienation of the beneficiaries' interest, are void (*see also RESTRAINT OF MARRIAGE; PERPETUITY; THELLUSION*). Trusts of land must for the most part be evidenced by writing signed by the settlor. Trusts of personal property may be created orally, though it would be highly inadvisable not to use written instruments.

Trustees may employ agents, and are not liable for their default, but they should not allow money or property to remain in the hands of a solicitor or banker longer than is reasonably necessary to enable him to pay or transfer it to the trustees (Act of 1925, Section 23); but under Section 11 of the Act of 1925 the trustee may leave money with a banker pending investment. A trustee who is going abroad for more than a month may delegate his trust to an attorney provided the latter is not his sole co-trustee, but he will, notwithstanding, remain liable for the default of the attorney.

Previously to the Act of 1925, the appointor of new trustees could not appoint himself, but he may now do so, so that now the tenant-for-life under a Settlement (q.v.) may appoint himself trustee of the Settlement. The Court may appoint new trustees 'whenever it is expedient' and there is difficulty in

doing so without its help, e.g. where the trustee is a convict, lunatic, or bankrupt, or, being a corporation, has been dissolved. The power of advancing capital money to the persons entitled absolutely or contingently on reaching any specified age, or on the concurrence of any other event, may extend to as much as one-half of the capital in the case of personality settlements, but no advancement may be made so as to prejudice any person entitled to a prior life or other interest, whether that interest be vested or contingent, unless such person, being of full age, gives his consent.

Trust Corporation is defined by the Trustee Act of 1925 to mean the Public Trustee or a corporation appointed by the court in any particular case to act as trustee, or a corporation entitled, under rules made pursuant to the Trustee Act, 1906, to act as 'custodian trustee.' Recent acts have extended the powers and facilities given to such corporations. These corporations are generally banks and insurance companies, but, by the Law of Property Amendment Act, 1926, there are included the Treasury solicitor and official solicitor, and any person holding any other official position presented by the Lord Chancellor, the trustee in bankruptcy, and also certain charitable corporations. Recent legislation has extended the powers of such corporations; e.g. they may give valid receipts for the purchase money of land (Trustee Act, 1925, Section 14). Experience shows that banks and insurance companies have been ready to assume these privileges and to accept such trusts either directly or through companies formed by them for the purpose; and indeed it is possible to see in such corporations the natural and appropriate substitute for the gratuitous trustee. Express provision for the remuneration of the trustee corporations can be made in the instrument appointing them. If the court appoints the corporation it may fix its remuneration. See Sir A. Underhill, *Law of Trusts and Trustees* (10th ed.), 1950 (supplement 1955); G. W. Keeton, *Law of Trusts* (5th ed.), 1950; T. Lewin, *Law of Trusts* (15th ed.), 1950 (supplement 1955).

Truth, in philosophy, is defined by Jacques Maritain as a word which expresses, as it really is, the speaker's thought, and a true thought represents, as it really is, the thing to which it refers. T. in the mind therefore conforms with the thing. The degree of T. depends upon our organs of knowledge. The search for T. and especially criticism of T. form a branch of philosophy called epistemology (q.v.). Nietzsche regarded T. as a form of letter which the world must, to know itself, break asunder, while at the opposite pole are the sceptics, who challenge the possibility of T. in itself. Famous sceptics include the ancients Pyrrho, Arcesilas, and Carneades; Montaigne and Sanchez in the 16th cent., with David Hume in the 18th cent. Later philosophers who challenged ratiocination as capable of finding T. include Rousseau, Fichte, Schopenhauer, Bergson, and Wm

James. They claim that T. is to be found rather in the will, in feeling, or in action. Rationalists hold that T. is easy to attain, and undertake to bring all things within the comprehension of reason, which is competent to attain T. independent of reality, or of God. They claim to achieve perfect wisdom by natural powers, and reject the necessity of Divine revelation. Descartes, Malebranche, Spinoza, and Leibniz (q.v.) are among them. The school of Aristotle and St Thomas Aquinas teaches that T. is neither impossible nor easy to attain. It is thus opposed to both sceptics and rationalists. Kant, the founder of subjective philosophy, and his successors Schelling and Hegel, deified the human subject of knowledge, and rationalism and scepticism appear to find common ground in their anti-intellectualism. Such philosophy is termed modernist. See the works of the philosophers mentioned above; also KNOWLEDGE; PHILOSOPHY; METAPHYSICS.

'*Truth*,' weekly paper pub. in London, founded in 1877 by Henry Labouchere. Notable for its attacks on fake and humbug, T. devoted special attention to politics, the arts, finance, and social topicalities. Ceased pub. Dec. 1957.

Trutnov (Ger. *Trautenau*), Czechoslovak town in the region of Hradec Králové (q.v.), near the Polish border. It has a linen industry. Pop. 18,400.

Tryfan, 3010 ft, mt in N. Wales, noted for its striking pyramidal appearance and general steepness of incline. The best view of it is from the Capel Curig side. It stands above lake Ogwen, with Snowdon to the SW., separated from it by the Glyders and the Llanberis pass. The upper half of the E. and SE. faces is a precipice which offers some of the best and safest rock climbing in Britain. The foot of the climbs can be reached in a few hrs either from Pen-y-pass or Ogwen. The prin. features are the N., central, and S. buttresses, with the intervening N. and S. gullies, and the climbs all lead to the rocky summit ridge capped by its twin 10-ft monoliths, Adam and Eve.

Trygon, see STING-RAYS.

Trypanosomes, *Trypanosomiasis*, see SLEEPING SICKNESS, TSETSE FLY, and TROPICAL MEDICINE.

Tsagris, *Kleomenis-George* (1889-), Gk writer, b. Nauplia. He studied at Athens Univ. where he received the degree of Doctor of Law. His prose possesses a poetic quality based on deep emotion and thought. His masterpiece is the prose poem, *Hardas*, 1925, and other works include *Rósi*, 1916, *A Spring Ramble* (three lyric novels), 1919, and *Blue Narcissus*, 1926.

Tsaidam (or *Tsádum*), central Asian region in the prov. of Chinghai, China, lying between NE. Tibet and W. of Koko-nor, formerly the bed of a vast salt lake. Oilfields have been worked since 1956, and a railway is being built from Lanchow to T.

Tsamkong, see KWANGCHOWWAN.

Tsana Lake, see ETHIOPIA.

Ts'angwu, see WUCHOW.

Ts'ao Chih, Prince, see CHINESE LITERATURE.

Tsar, title of the kings of Bulgaria and of the monarchs of Muscovy from the 15th cent. until Peter the Great took the title of Emperor of All Russia. The title T. was, however, widely used unofficially throughout the Imperial period. Though derived from Lat. *Cæsar*, it lost its Imperial rank (cf. *Ger. Kaiser*) and became equivalent to King.

Tsaritsyn, see STALINGRAD.

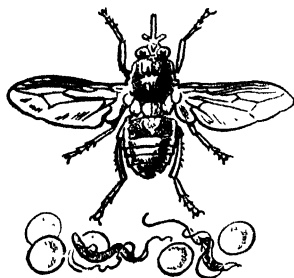
Tsarskoe Selo, or **Tsarskoye Selo**, see PUSHKIN.

Tsavo National Park, see KENYA COLONY AND PROTECTORATE, *Divisions and Physical Features*.

Tschaslau, see ČÁSLAV.

Tschudi, **Giles** or **Aegidius** (1505-72), Swiss chronicler, a zealous Catholic, became 'landammann' or chief magistrate of Glarus. His *Chronicon helveticum*, 1000-1470, in spite of its unreliable character, remains a groundwork of Swiss hist., containing one of the prin. accounts of Wm Tell (q.v.).

Tsetse Fly, fly belonging to the same family (Muscidae) as the common house flies, 4 species of which, *Glossina morsitans*,



TSETSE FLY

G. swynnertoni, *G. tachinoides*, and *G. palpalis* are the cause of enormous loss among domesticated animals in most parts of tropical Africa. It is a blood-sucker, and though its bite is not itself dangerous, it is the means by which a parasitic protozoan is introduced into the blood, causing trypanosomiasis or sleeping sickness (q.v.) in humans or 'nagana,' i.e. fly disease, in the case of cattle and other beasts. *G. palpalis* has entirely different habitats from *G. morsitans*, the former breeding mostly in riverine bush, the latter in savannah country; and control measures therefore differ in each case, though the object in both cases is to break the contact between the T. F. and man. The T. F. is similar in appearance to the house-fly, but has a very long and slender proboscis. The wings are more leaden and more opaque, and the thorax is chestnut with 4 black longitudinal stripes. The abdomen is yellowish-white with a black spot on 4 of the 5 segments. T. F. is widely distributed throughout Central

Africa, infected areas being found on the W. coast, in the Belgian Congo, in E. Africa, and as far S. as the Rhodesias. New patches frequently occur, as migrations of fly are frequent in areas in which it is hitherto unknown. The same family of flies conveys both human and animal disease, and not only occasions widespread human suffering, but renders it impossible to keep cattle and other live-stock in large areas. An epidemic of trypanosomiasis along the shores of Lake Victoria Nyanza early in this cent. is said to have caused the death of a quarter of a million people. The Royal Society sent out 2 commissions to Uganda to investigate the disease. Sir David Bruce, a member of the first commission, concluded that the disease was due to infection with a trypanosome. Prof. F. K. Kleine found that the trypanosome underwent cyclical development in T. F. From these and other researches it is commonly agreed that human trypanosomiasis is due to the infection of man with either of 2 species of trypanosome, *T. gambiense* or *T. rhodesiense*; and that these trypanosomes are conveyed by certain species of T. F., either by direct transmission of a trypanosome from one infected person to another, or by cyclical transmission, after the trypanosome has undergone a certain part of its cycle of development in the tissues of the T. F., the latter being the more usual method. One theory of the development of human trypanosomiasis is that both parasites (*T. gambiense* and *T. rhodesiense*) are altered forms of *T. brucei*, the cattle and game trypanosome (other virulent forms of cattle or game parasite are *T. congolense* and *T. vivax*) which normally dies when introduced into man. Expert opinion holds the view that wild animals are undoubtedly a reservoir for *T. rhodesiense*, which causes a more acute disease for man than *T. gambiense*. Remedies for dealing with the T. F. include the killing of game to limit the range of infection and the burning of bush to exterminate the fly, but in the latter case the resulting deforestation may form the starting-point of new soil erosion. As the result of further research begun in 1944 and experimentation with a new drug then known as M.7555, a drug named Anttrycide was eventually discovered which gives immunity for definite periods to cattle, horses, camels, and other animals. It has been estab. that a single treatment will cure cattle of *T. congolense* and *T. vivax*, the 2 worst forms of the disease, and it has been used with success against the *T. brucei* infection in cattle, horses, and dogs, against *T. evansi* in cattle, and against *T. simiae* in pigs. See Lord Hailey, *An African Survey*, 1938; J. Smart, *Insects of Medical Importance*, 1943; B.M.A. (ed. H. Clegg), *Fifty Years of Medicine* (Chapter 'Fifty Years of Tropical Medicine'), 1950.

Tsimshian Language, see NORTH AMERICAN NATIVE LANGUAGES: *Pacific Areas*.

Tsimshians, or **Chimmesians**, tribe of N. Amer. Indians, who dwell along the shores of the Pacific, facing the Queen

Charlotte Is. They live mainly by hunting and fishing. There are to-day some 6100.

Tsinan, or **Chi-nan**, cap. of the Chinese prov. of Shantung, was the first city in the Chinese Empire in which a foreign commercial settlement was voluntarily opened by the Chinese Gov. (1900). A considerable number of foreigners and foreign institutions, including the Shantung Christian Univ., have for many years estab. themselves in it. There are many factories. T. is one of the healthiest cities in China, and the city is famous for its many springs and lakes. The pop. is estimated at 600,000, of whom some thousands are Muslims.

Tsinchow, see CHINGCHENG.

Tsingtao, city on Kiaochow (Chiaochow, or Chiao-chow) Bay, Shantung, China. T. was leased to Germany in 1898 for 99 years and a harbour and fortress were developed there by the Ger. Gov. When the First World War broke out the harbour served as a base for Ger. raiding warships. It was blockaded by the Jap. Navy, and a Brit.-Jap. military force attacked it from the N. By the end of Oct. 1914 the investment had begun and the fortress capitulated on 7 Nov. 1914. Restored by Japan to China in Dec. 1922, it was taken by the Japanese in the Sino-Japanese War, but restored to China after the Second World War. Kiaochow Bay is a well-protected natural harbour, 19 m. long by 15 m. wide. The Jap. salt fields and fisheries at T. were taken over by the Salt Administration under the Sino-Jap. Agreement of 1922, and China paid Japan 2,000,000 yen. The National Shantung Univ. is situated in T., which is connected by railway with the prov. cap. Tsinan and the port of Chefoo. T. is the best seaside resort in N. China. Pop. (including neighbouring dist.) 1,100,000.

Tsuga, Hemlock or Hemlock Spruce, a genus of 10 species of evergreen conifers, family Pinaceae, of which *T. heterophylla*, W. Hemlock, *T. canadensis*, E. Hemlock, and *T. merletiana*, Mountain Hemlock, are N. Amer. forest trees, now grown in Britain.

Tsünyi, Chinese city in Kweichow prov. on the Chungking-Kweiyang railway (begun in 1957). In Jan. 1935 the Politic-Bureau of the Chinese Communist party held its enlarged congress in T. in which Mao Tse-tung was elected Chairman of the party and assumed leadership, which eventually led to the co-operation between the Nationalist gov. and the Communists during the Sino-Japanese War (1937-45). See CHINA, *History*.

Tsushima, Is. of Nagasaki, Japan, situated S. of Korea. It is mountainous, and really consists of 2 Is., the uniting neck being dry only at low tide. There are also included some 40 adjacent small Is. In the strait of this name (in 1905, during the Russo-Jap. war), the Russian fleet was annihilated by the Japanese under Togo, and following this the Russians were driven out of Korea and Manchuria. Area 262 sq. m.; pop. 39,000. Prin. tn Izuhara. See A. S. Novilloff-Prilsoy, *Tsushima* (Eng. trans.), 1936.

Tayetsyn, see QUELPART.

Tu Fu, see CHINESE LITERATURE.

Tuam, chief tn in N. Galway, Rep. of Ireland. There are 2 cathedrals: that of the Church of Ireland has been rebuilt round the anct Catholic structure (c. 1130); the present Rom. Catholic cathedral was erected c. 1846. T. is the seat of a Catholic archbishop and a Protestant bishop. It has a beet-sugar refinery and is noted for its live-stock fairs. Pop. (urban dist.) 4000.

Tuamotu Archipelago (also called **Panmotu**, Low or Dangerous Archipelago), comprises a dozen fairly large atolls and countless small atolls and reefs, which make navigation extremely dangerous. Scattered over 15° of long. and 10° of lat., E. of the Society Is. (q.v.). Area 343 sq. m.; pop. in 1951 7245. From the middle of the last cent., for 50 years, the Tuamotus were famed for their pearls. But with the introduction of diving apparatus the mtrks became glutted, and the Fr. Gov. took drastic action to control the industry. It was on Raroia, one of this group, that the famous raft Kon-Tiki ended its voyage from Peru in 1947. H.Q. of the Fr. administration is on Apataki. At the SE. extremity of the Tuamotus is a group of high volcanic Is. known as Mangareva (or the Gambiers), which is administered as a separate dist.

Tuapse, tn in the Krasnodar Kray of S. Russia, Black Sea port. There are metal-working, oil refining, and food industries, and oil is exported (pipeline from Grozny). Pop. (1939) 30,000. T. was founded as a fort in 1838; it was the scene of much fighting in 1942.

Tuaregs, tribe of Berber Arabs, inhabiting the region of the Sahara. By complexion they are a 'white' race and their main characteristics are dark hair and hazel eyes. They are a war-like tribe and adhere to the Mohammedan religion. The men wear veils. These nomads have large flocks of camels and goats. See BERBERS.

Tuatera, see SPHENODON PUNCTATUS.

Tuba. An anct Rom. military instrument of the horn type; now the bass instrument of the horn family, used in the orchestra as the bass of the brass instruments and more often associated in 4-part harmony with the trombones than with the horns, though its tone is nearer the latter. The instrument, owing to its 3 or 4 valves, controls a complete chromatic scale from F, an octave below the bass-clef stave to c. F an octave above it.

Tubal-cain, son of Lamech by his wife Zillah (Gen. iv. 22) described as 'instructor of every artificer in brass and iron.' He is hence regarded as the legendary founder of the metal industry, the earliest of all blacksmiths, and has been compared with Vulcan. According to Jewish tradition he was distinguished for his great strength and success in war, and was responsible for the slaying of his ancestor Cain. Attempts have been made to identify him as the eponymous ancestor of a Scythian people of the same name who dwelt near the Black Sea.

Tubercles, Root, see ROOT TUBERCLES.
Tuberculosis, infectious disease caused by the bacillus *Mycobacterium tuberculosis*, and characterised by the formation of tubercles. Tubercles as a rule proceed to abscess formation, the pus having the appearance and consistence of cheese. The caseous mass may slowly calcify and be surrounded by fibrous tissue. In this way the disease may be healed, and most adults have healed, calcified tuberculous foci resulting from infection in childhood. In other cases the tubercle does not heal to the extent of calcification, but remains latent and surrounded by a varying amount of fibrous tissue. These lesions are apt to break down and become active again under any conditions in which the host's resistance becomes lowered. Thus over-tiredness, malnutrition, intercurrent infections, or physiological strain, as in pregnancy, may cause a quiescent primary focus to become active. Again, the caseous abscess may grow in size and, overcoming the forces of natural resistance, eat its way farther into the surrounding tissues. If not halted in its spread, the disease and the increasing toxæmia may lead to death. Sometimes the forces of attack and defence strike a balance and caseation remains at a chronic stage. Caseous pus may discharge through a sinus either into a bronchus or from a joint or lymph gland to the body surface, and by this means a persistent abscess cavity with a sinus is formed.

The 3 common types of tubercle bacillus are the human, the bovine, and the avian. The avian type is not infectious to man. Tuberculous lesions occur mostly in the lungs (phthisis), the intestinal tract (tabes mesenterica), the lymphatic glands, the bones and joints, the skin (lupus), and the meninges of the brain (tuberculous meningitis). In England 99 per cent of pulmonary T. and 75 per cent of non-pulmonary T. are due to the human type of infection. The 25 per cent of bovine type, non-pulmonary T. occurs mostly in children. But any lesion is capable of originating a secondary spread into any tissue through the bloodstream or lymphatic channels. A tuberculous septicaemia may cause a miliary, or generalised, infection, setting up secdling tubercles throughout the body—a highly dangerous condition, earning for itself in the old days the title of 'galloping consumption.' T. was known to the ancients and went by various names, according to the site of the lesion, such as scrofula, and king's evil, phthisis, consumption, and decline. Bunyan graphically, and correctly, called T. 'the captain of the men of death.' Villemin, in 1865, proved experimentally that T. could be transmitted from one host to another, but it was not until 1882 that Koch cultured and identified the specific infecting bacillus. Thereafter began attempts to produce specific antitoxins or vaccines along the lines that were being successfully followed in other infections. Tuberculin vaccine had its practical difficulties and dangers. When

injected intradermally in small, diluted doses, however, it formed a useful diagnostic test for T., a positive reaction being shown by a red, sometimes vesiculated reaction at the site of injection. This method was developed by the French physician, Mantoux. Spahlinger's (q.v.) treatment (1912), by first injecting antitoxins and then tuberculin, found only temporary favour in this country. Immunisation by the attenuated Bacillus Calmette-Guérin (B.C.G.) was used in France, where it originated, and Scandinavia for many years, but it was not until 1949 that it was taken up seriously in this country. Results with it have proved encouraging, and as a prophylactic it is beginning to be used extensively in infants and in those exposed to special risk, such as students and nurses, in whom the Mantoux test is negative.

The main significance of Koch's identification of the tubercle bacillus was that it led the way to an epidemiological attack on the disease. It was established that the reservoirs of infection were, on the one hand, human beings with T., and, on the other hand, infected cattle. In human T. the infection is conveyed to others by exhaled droplet particles either from direct contact or from coughing or sputum. The T. bacillus is very resistant in the dried state, and dried sputum may be a source of infected dust for as long as 6 months. Sunlight is lethal to the T. bacillus. In bovine T. infection is conveyed to the human host in infected meat and in milk. It has long been recognised that social and environmental conditions affected the spread of T., and that it was more prevalent where there was overcrowding and when standards of nourishment and living conditions were low. The epidemiological attack, therefore, had to be directed at eradicating sources of infection and improving social conditions. Treatment by prevention has in fact been the main principle of the attack on T. since the turn of the cent. That it has had success is shown by the statistics. The death rate from T. in 1900 was about 150 per 100,000; in 1950 it was 50. The last few years has seen a faster fall, and in 1954 the death rate was in the region of 17 per 100,000. Notifications, however, are still at the same level as pre-war. Except for rises during the 2 wars, when nutrition and environmental conditions were worsened, the decline in the death rate, therefore, has been steady. T., however, is still the principal killing and incapacitating disease affecting the population between the ages of 15 and 40, and there is little room for complacency.

Measures for eradicating bovine T. have consisted of eradicating, so far as possible, infected cattle. Tuberculin testing of herds is extensively practised, and milk from certified tuberculin-tested (T.T.) cows is now widely on the market. In Great Britain 60 per cent of the cattle are now attested. Pasteurisation of milk is almost universal. T. of the bones, glands, and intestinal tract has become far less common as a result. Apart from the various attempts at prophylactic

vaccination already mentioned, measures for eradicating the human type of T. have been directed, first, towards earlier diagnosis of the disease (and thus earlier discovery of sources of infection) and, secondly, towards better housing and working conditions, and increasing natural resistance. T. became a notifiable disease in 1913. Local authorities, through their medical officers of health, became the responsible bodies for T. prevention. Chest clinics for the examination of suspected cases were started and also sanatoria for segregation and treatment. Contacts of diagnosed cases were kept under observation and advised on the principles of prevention. The same methods are used to-day, but more extensively and under different administrative arrangements. Precision in diagnosing early T. has advanced with the advance of X-rays. It is too soon yet in this country to judge the contribution of B.C.G. vaccination to a lowered incidence of the disease in young people. In the U.S.A., where B.C.G. vaccination has been practised for some years, a lower rate of infection among adolescents is showing itself in the results of tuberculin tests on recruits for the armed services. In 1949 and 1950 10.6 per cent of the recruits joining the U.S. Navy and Marines were positive reactors, compared with 65.6 per cent of the National Servicemen in Britain. By 1954 the percentage of positive reactors among the American recruits had fallen to 4.6 per cent. One hopes that figures for Great Britain will follow the same pattern. A recent preliminary report (*British Medical Journal*, 1956, I, 413) to the Medical Research Council by its Tuberculosis Vaccines Clinical Trials Committee of a trial carried out on 56,700 British school children aged between 14 and 15 in London, Manchester, and Birmingham has shown that vaccination substantially reduces the risk of contracting T. in these children. Two types of vaccine were used, B.C.G., and one made from the vole tubercle bacillus.

Rest, fresh air, and a nourishing diet fortified with the fat-soluble vitamins remain the basis of the treatment of T. Measures such as artificial pneumothorax, phrenic crush, and thoracoplasty, which collapse and thereby put at rest an affected lung, have been in vogue and are still used in some cases. Pneumectomy, or complete surgical removal of the affected lung or part of it, has recently proved invaluable in suitable cases. The search for a chemotherapeutic agent specific against the tubercle bacillus was unrewarding for many years. The early sulphamidides and, later, penicillin were found to be ineffectual. In 1944, however, Waksman and his colleagues in the U.S.A. demonstrated the effectiveness of a new antibiotic, streptomycin, against T. The chemical substances isoniazid (isonicotinic acid or I.N.H.) and para-aminosalicylic acid (P.A.S.) have also been found to have a specific action against the *mycobacterium tuberculosis*. Bactericidal and bacteriostatic chemo-

therapeutic agents tend to suffer from the disadvantage that bacilli develop strains resistant to them, and streptomycin, I.N.H. and P.A.S. are no exceptions. But they represent a great advance in treatment, and have been responsible for arresting the disease in many young patients and rendering many older patients non-infectious (sputum negative). T. is now tending to become a chronic more than an acute disease. In military T. and tuberculous meningitis they may be life-saving, and experience has shown that if streptomycin is used in combination with one or other of the chemotherapeutic substances resistant bacterial strains are not so likely to develop. Although advances in treatment have greatly reduced the mortality of T. the number of notifications of new cases has not dropped in proportion. This is partly due to a large increase in the use of mass radiography (see RADIOLOGY), and consequent discovery of symptomless, unsuspected cases, which might have escaped attention otherwise. Further improvement in morbidity statistics must depend on medical advances, on the intensifying of social and administrative measures, and last, but by no means least, an increased sense of individual social responsibility. Tribute must be paid to the National Association for the Prevention of Tuberculosis (N.A.P.T.) for, among other things, its educative work among the public. See W. G. Savage, *Prevention of Human Tuberculosis of Bovine Origin*, 1929; F. Heat and N. L. Rusby, *Recent Advances in Pulmonary Tuberculosis* (4th ed.), 1948; J. A. Myers, *Tuberculosis among Children* (3rd ed.), 1951; J. Maxwell, *The Care of Tuberculosis in the Home* (2nd ed.), 1947; S. R. Gloyne, *Social Aspects of Tuberculosis*, 1944; *Prophyl Tuberculosis Survey*, 1948; *Report of Joint Tuberculosis Council* (Cmd. 9566, H.M.S.O., London), 1955.

Tuberculosis, in Cattle, see CATTLE.

Tuberoses, see POLIANTHERS.

Tubes. Steel T. for a wide variety of engineering uses can be classified in 2 main headings: seamless or weldless, and welded. The first step in the manuf. of seamless T. is the introduction of a mandrel or point over which the billet is rolled to form a cylindrical shell. The operation is known as piercing. The pierced billet is reheated to bring the metal to a forging temp. and passed to a plug rolling mill, where the diameter and wall thickness are further reduced while the length is increased. In making pipes over 16 in. in diameter the rolled tube after being reheated is delivered to the rotary mill. In this mill the diameter is increased and the wall thickness reduced to approximately finished dimensions before delivery to the rolling mill, which burnishes the inside and outside surface and tones up the tube, which is slightly oval in shape as it leaves the plug rolling mill. In the sizing mill the pipe, either cold or reheated if necessary, is passed over 2 or more sets of sizing rolls where the final reduction gives a uniform diameter and roundness throughout the pipe length.

The pipe is now cooled off, strengthened if necessary, inspected, and finally cut to the required lengths.

Welded tube is produced from flat strips of the thickness of tube wall required and of just slightly greater width than the circumference of the finished product. The strip is reheated to a welding temp. and bent round by specially designed rolls and the 2 ends compressed together so that they weld up into a tube. Welded tubing has the advantage that a more uniform wall thickness can be obtained, free from drawing marks. The manuf. of welded T. is quicker and less expensive than the production of weldless.

Although the largest tonnages of steel tube are made from steel containing about 0.06-0.10 per cent carbon, 0.35 per cent manganese, sulphur, and phosphorus below 0.05 per cent of the rimming type, steels of 0.30-0.55 per cent carbon are also used, and where greater strength is required a high carbon-nickel steel can be supplied. It is now possible to obtain commercial tubing of high tensile strength for automobile and aircraft purposes in a wide range of alloy steels. These steels include nickel, nickel-chromes, chromium, stainless, etc.

Tubes, Pneumatic, used for the conveyance of documents, letters, telegrams, or small parcels. The object to be conveyed is placed in a gutta-percha or steel cylinder which is driven to its destination by suction or compressed air. The systems range from those used in departmental stores, in Post Offices, and other public services, to every type of industrial organisation. The pneumatic tube has become one of the most economical and quickest means of transmitting both documents and quite heavy articles (tubes and containers of special design can be made to users' requirements) from one dept to another over considerable distances.

Tübet, see TIBET.

Tübingen, Ger. tn in the *Land* of Baden-Württemberg (q.v.), in the Neckar (q.v.) valley, 18 m. SSW. of Stuttgart. It was once a free city of the empire. There are many picturesque streets and fine old buildings. The massive castle of the Counts Palatine dates from the 11th cent., and the collegiate church and the *Rathaus* from the 15th cent. T. Univ. (1477) is famous, in particular for its 19th-cent. school of theology (see BAUR). The tn also has a hospital for tropical diseases. There is a publishing industry, and there are manufs. of surgical instruments. Pop. 44,000.

Tubize (Flem. *Tuboke*), tn in the prov. of Brabant, Belgium, 13 m. SSW. of Brussels. It has important manufs. of artificial silk, locomotive-works, and brick-kilns. Pop. 9100.

Tucker, Sophie (1884-), Amer. actress and entertainer. She first appeared as a singer in her father's café in Hartford in 1905, then went into cabaret and variety in New York. Her first Music Hall engagement was on 116th Street, New York, in 1906 as a 'black face' act. She toured with a troupe known as 'The Gay

Masqueraders' and, after more variety (or vaudeville), went into revue at the Jardin de Paris, New York, in *The Ziegfeld Follies of 1909*. After many successes she became famous in vaudeville, and visited England for the first time in 1922, as a cabaret singer and music-hall artist. Soon she was a star in both London and New York. She became tremendously popular as a 'Red Hot Momma,' singing her songs with great force and drive and immense attack, and few people to-day know how to 'put over' a song better than she does. She is equally at home in sentimental numbers like 'Yiddisher Momma' and in songs like 'The Lady Is a Tramp.' A woman of great personality and expansiveness, she is popular on and off stage.

Tucson, co. seat of Pima co., Arizona, U.S.A., and the largest city of the state. T. has grown with great rapidity during recent years. It is an important rail and trading centre, particularly for local farming products. The climate is dry, and irrigation farming is carried on. Cotton, alfalfa, and grain are produced. T. manufs. tiles, bricks, electronic equipment, iron products, paint, and plumbing materials. Mining is an important industry. Here are situated the Univ. of Arizona, founded in 1891; the State School for the Deaf and Blind; and U.S. mining, botanical, and agric. stations. T., owing to its dry climate, is a favourite resort for winter visitors. Nearby is Davis-Monthan Air Force base. Pop. 45,450.

Tucumán: 1. Prov. of NW. Argentina. The W. part is mountainous and covered with forest. There are mines of gold, silver, and base metals. The chief products are sugar, cereals, fruit, and tobacco. Area 10,430 sq. m.; pop. 740,530.

2. Cap. of the above prov., has a cathedral in which is still preserves the cross used at the founding of the city in 1565, a univ. founded in 1914, and Jesuit college. It is the busiest tn in the N. of Argentina and is chiefly engaged in sugar refining and distilling. It is connected by rail with Córdoba, and Rosario, and with Bolivia. Here in 1816 was held the first Congress of the Rep., when the independence of Argentina was declared. Pop. 205,000.

Tudela (anc. *Tutela*), Sp. tn in the prov. of Navarra, on the Ebro. It has a fine Romanesque-Gothic church, formerly a cathedral, and a trade in agric. produce, timber, and wine. Pop. 14,100. See IMPERIAL CANAL OF ARAGÓN.

Tudor, see TODI.

Tudor, surname of an Eng. dynasty, founded by a Welshman, Owen T., who is said to have married Catherine, widow of Henry V. By her he was the father of Edmund, Earl of Richmond, who married Margaret, great-granddaughter of John of Gaunt. The son gained the crown after defeating Richard III at Bosworth, and as Henry VII reigned from 1485 to 1509. The other T. monarchs were: Henry VIII (1509-47), Edward VI (1547-53), Mary (1553-8), Elizabeth I (1558-1603).

Tudor Architecture, see ENGLISH ARCHITECTURE.

Tuesday, the third day of the week, from *Ty* or *Tyr*, the Mars of the Northmen, because the first hour of T. was supposed to be ruled by the planet Mars—hence the Fr. *mardi* for Tuesday.

Tufa, Calcareous, see CALCAREOUS.

Tuff, term which includes the finer kinds of volcanic detritus. Beds containing large blocks are called agglomerates.

Tug, any small craft equipped to tow larger vessels or trains of barges. A T. must have good manoeuvrability, and tends therefore to be a shortish vessel, often with twin screws. She must have power adequate for her duties, and in the interests of propulsive efficiency usually has a comparatively large slow-turning propeller giving a good grip on the water. Reciprocating steam engines were formerly the rule, but nowadays geared diesel engines are common. The appearance of the Thames T., 80–120 ft long, is typical, but in other parts of the world local needs have given rise to vessels of very different appearance; on the Rhine and Mississippi, for example, where long barge trains are towed for distances taking days to cover, tugs must have sufficient superstructure to provide accommodation for the crew. The onerous duties of salvage T.s require them to be especially seaworthy and powerful; they are fitted with heavy towing gear, pumps, and fire-fighting equipment. The Dutch have an international reputation for this kind of work. In Britain the Admiralty T.s of the 'Bustler' class, with geared diesel machinery of 4000 b.h.p., carry out much work under charter by commercial salvage and towage concerns. See also SALVAGE, *Salvaging Ships*.

Tugela, riv. of Natal, S. Africa, has its source in the Drakensberg Mts, flowing in a SE. direction, past Ladysmith and Colenso, to empty its water into the Indian Ocean. At Isaandhlwana and Rorke's Drift on the T., actions were fought in the Zulu war (1879).

Tuileries, Palace and Garden of the, ancient residence of the Fr. sovereigns in the centre of Paris. It was begun by Philibert Delorme (q.v.) in 1564, at the order of Catherine de' Medici, in a place once a cattle-works. It was the seat of executive authority during the Revolution, and the Emperor's residence during the Empire. It was burned by revolutionaries during the Commune of Paris (q.v.), and afterwards demolished. The gardens, planned by Le Nôtre (q.v.), still exist. See monograph by G. Lenotre, 1935.

Tuke, Henry Scott (1858–1929), painter, b. York, son of Daniel Hack Tuke, physician and great-grandson of W. Tuke, the Quaker philanthropist. He settled in Cornwall, and was one of the later members of the 'Newlyn School' of artists. Elected R.A. 1914. He painted mostly youthful nudes against a marine background.

Tuke, William (1732–1822), philanthropist and Quaker, b. York. Pioneer in the humane and scientific treatment of the insane, he induced the Society of

Friends to take this matter up, and in 1796 the York Retreat was opened. See D. H. Tuke, *Chapters in the History of the Insane*, 1882.

Tula: 1. Oblast in Central Russia. S. of Moscow, situated on the Central Russian upland, with some mixed forests in the N. and black-earth soil in the S. It has lignite (see MOSCOW COAL BASIN) and iron ore deposits. Area 9400 sq. m.; pop. c. 1,900,000, Russian. There are metal-working (since 16th-cent.), coal-mining, and chemical industries, grain and potato growing, cattle and hog raising. Chief towns are T. and Stalinogorsk.

2. Cap. and econ. centre of the above, main industrial centre of the Moscow Coal Basin, 120 m. S. of Moscow. There are large metallurgical (local ore) and engineering works (arms, machine-tools, transportation equipment); there are also other metalworking industries based on old iron-mongering crafts (T. *samovars*). It is an important railway junction (5 lines). The famous country house of L. Tolstoy—Yasnaya Polyana—is near by. Pop. (1956) 320,000 (1917, 157,000; 1920, 128,000; 1926, 155,000; 1939, 272,000). Known since 1146, it belonged to Ilyazan' principality, was Muscovite from 1503, and was often raided by Crimean Tatars; it was the prov. cap. from 1775. T. is an old centre of metalworking industry (arms supply to Muscovite gov. since 1595), largest in Russia until overtaken by the Urals in the 18th cent. It was the second largest town in Central Russia till the 1920s. German troops approached T. in 1941, but were thrown back.

Tulcán, tn of Ecuador, cap. of Carchi prov., and Customs station, near the Colombian frontier, 100 m. N.E. of Quito at an altitude of nearly 9000 ft above sea-level. It is the centre of an important stock-raising and field crop dist. Manufs. include wool, carpets, and ponchos. T. is on the new motor highway to Quito or Ibarra. Pop. 10,000.

Tulip, Tulipa, family Liliaceae, genus of over 50 species of Europe, temperate Asia, and N. Africa. *T. sylvestris*, wild T., has naturalised in Britain. The beautiful range of garden T.s are held to stem from *T. gesneriana*, and now include early-flowering groups (Duc van Tol, Medel, single and double forms); mid-season (Triumph); and May-flowering (Cottage, Breeders, Darwin, Rembrandt, and Parrots). *T. clusiana*, Lady T., *T. greigit*, *T. kaufmanniana*, Water-lily T., and others are notable species. Holland, Channel Is., and Lincs are commercial growing areas. Planting is done in Oct. and Nov.

Tulip Tree, or *Liriodendron tulipifera*, tall Amer. tree (family Magnoliaceae) bearing large fragrant flowers which superficially resemble those of the tulip; has sev. varieties. Source of the Amer. White Wood.

Tull, Jethro (1674–1741), agric. writer, b. Basildon, Berks. He tried out many ideas collected on his travels abroad and invented the first corn drill of note. In 1733 his major work, *Horse-Hoeing Husbandry*, was pub. in which he dis-

oussed the advantages of hoeing crops grown in rows. Many of his interesting theories on soils and fertilisers were completely erroneous.

Tullamore, co. tn of Offaly, Rep. of Ireland. It is on the Grand Canal and is a busy mrkt centre for a fertile agric. dist. Industries include wool-spinning, distilling, and brewing. Pop. 6200.

Tulle, Fr. tn, cap. of the dept of Corrèze. It is the seat of a bishopric, and has a 12th-cent. cathedral. There is a military school, and also a gov. armament factory. It gives its name to the fabric called 'T.' Pop. 18,200.

Tullius, see CICERO, MARCUS TULLIUS; CICERO, QUINTUS TULLIUS.

Tullius, Servius (reigned 578-534 BC) sixth King of Rome. The account of the early life and death of S. T. cannot be regarded as a real historical narrative. His mother, Ocrisia, was one of the captives taken at Corniculum, and became a female slave of Tanauquil, the wife of Tarquinius Priscus. He was born in the king's palace, and was brought up as the king's son, since Tanauquil, by her powers of divination, had foreseen the greatness of the child; and Tarquinius gave him his daughter in marriage, and entrusted him with the gov. The sons of Ancus Marcius, fearing lest he should deprive them of the throne which they claimed as their inheritance, procured the assassination of Tarquinius; but Tanauquil by a stratagem preserved the royal power for Servius. Three important events are assigned to his reign by tradition. First he gave a new constitution to the Rom. state. This constitution gave the plebs political independence, and assigned to property that influence in the State which had previously belonged to birth exclusively. Secondly, he extended the pomerium, or hallowed boundary of the city, and completed the city by incorporating with it the Quirinal, Viminal, and Esquiline hills. Thirdly, he estab. an alliance with the Latins by which Rome and the cities of Latium became the members of one league. By his constitution S. T. incurred the hostility of the patricians, who conspired with L. Tarquinius to deprive him of his life. According to the legend, Tullia, one of the daughters of Servius, an ambitious woman, who had paved the way for her marriage with L. Tarquinius by the murder of her former husband, Aruns, and of her sister, the former wife of Tarquinius, was one of the prime movers in this conspiracy. At her instigation Tarquinius entered the Forum arrayed in the kingly robes, seated himself in the royal chair in the senate-house, and ordered the senators to be summoned to him as their king. Servius hastened to the senate-house, and ordered Tarquinius to come down from the throne. Tarquinius seized the old man and flung him down the stone steps. Covered with blood, the king hastened home; but he was overtaken by the servants of Tarquinius, and murdered. Tullia drove to the senate-house, and greeted her husband as king; but her joy struck even him with horror. He bade her go home; and as

she was returning, her charioteer pulled up and pointed out the corpse of her father. She commanded him to drive on; the blood of her father spurted over the carriage and on her dress; and from that day forward the street bore the name of the Vicus Sceleratus, or Wicked Street. Servius had reigned 44 years.

Tullow, prin. tn of the E. of the co. of Carlow, Rep. of Ireland, on the R. Slaney. The Father John Murphy memorial statue stands in the mrkt square. Pop. 1700.

Tulsa, second largest tn of Oklahoma, U.S.A., and co. seat of T. co., on the Arkansas R. It was founded by the Creeks, who named it after their former Alabama cap., Tallasi. Its great oil boom began on 25 June 1901, when oil was struck by prospectors from Pennsylvania. It also produces iron, steel, and brass products, glass, aircraft, automobile parts, furniture, chemicals, textiles, plastics, paint, bricks, tiles, clothing, and packed meat and other food products. T. is the seat of the univ. of T. and the Spartan College of Aeronautical Engineering. Pop. 182,470.

Tulsi Das (1532-1623), Brahmin poet and religious reformer. He is said to have been abandoned by his parents as an infant and to have been picked up by a wandering sadhu, from whom he learned the story of the *Rāmāyana*. After his marriage he became an ascetic himself and lived at Ayodhya, where legend has it that Rama told him, in a dream, to write the story of the *Rāmāyana* in the language of the common people. His version of the *Rāmāyana*, 'Ram-charit-manas', was the first of his great works, and it estab. him as the greatest poet in Hindi literature and the one who has brought the epic story to the masses. Without professing to do so, he has thus exerted a deep and lasting influence on the Hindu masses, especially in N. India. A trans. of his *Ram-charit-manas* has been made by F. S. Growse, 1935.

Tumaco, tn and port of Colombia, standing on an is. near the entrance to T. Bay almost at the most southerly part of the W. coast. Being less than 2° N. of the Equator it has a hot, unhealthy climate. It is in steamship communication with Buenaventura (170 sea m.) and Panama, and exports cacao, tobacco, and tagua. Gold is mined inland. The old wooden tn was largely destroyed by fire in 1947, but has been rebuilt. Pop. 35,000.

Tumbes: 1. Prov. of N. Peru, lying between the S. shore of the Gulf of Guayaquil and the Cerros de Amotane, bordering on Ecuador. It has an area of 1590 sq. m.; pop. 31,550.

2. Cap. of the above, is situated on the R. Tumbes, 70 m. NW. of Loja. Tobacco-growing and charcoal-burning are carried on. Pizarro is said to have landed here for his invasion of Peru. T. is the point from which the Pan-Amer. Highway begins. Pop. 8000.

Tumbrel, or Tumbrel, ducking-stool used to punish scolding women in olden times. It consisted of a stool or chair at the end

of a long pole, which could be swung over a pond and lowered. It was also used to punish transgressing bakers and brewers. The same name was applied to carts constructed with a tipping body, especially dung-carts, to the covered carts for tools, etc., in a train of artillery, and also to the execution carts used in the Fr. Revolution.

Tummel, riv. and loch in Perthshire, Scotland. From the E. end of Loch Rannoch, the R. T. broadens into Loch T., $\frac{1}{2}$ m. wide and 7 m. long. $1\frac{1}{2}$ m. E. of the loch are the picturesque T. Falls, where the riv. joins the Tay, 7 m. NNW. of Dunkeld, the Garry having joined it at the falls. In 1945 a plan was made to divert and impound the Rts. Garry and T., Errochty Water, Bruar Water, and Loch T. to produce hydro-electric power.

Tumour, swelling, more particularly a new growth that is not the result of inflammation. The term was originally applied to any enlarged condition of a structure, but scientifically, a T. is a mass of cells, resembling those normally present, but differently arranged, and proliferating at the expense of the organism without serving any useful purpose. The cells of typical T.s resemble those of the parent mass of cells; those of atypical T.s may be so modified that it is difficult to trace their origin. The cause of such proliferation is not yet known: little can be said beyond the hypothesis that the normal processes of cell growth are disturbed by local conditions not occasioned by bacterial invasion or any extrinsic influences. T.s are broadly classified into *non-malignant*, *innocent*, or *benign*, and *malignant* or *cancerous*. The essential characteristics of non-malignant T.s are that they grow and divide without destroying or invading the surrounding cells which are simply pushed aside as the mass of the T. grows. A thin layer of fibrous tissue forms a definite boundary to the extent of the T., and if the growth be excised completely no recurrence can take place. Malignant T.s, on the other hand, tend to invade the surrounding tissues. There is no definite boundary, and the cells infiltrate into neighbouring tissues and replace the normal cells. Cancer (q.v.) cells may also be disseminated by means of the lymph channels to other parts of the body, giving rise to secondary or metastatic T.s. When the original T. has been excised there is great probability of the growth recurring, and it is difficult to say at any time how far its influence has extended. Powell White classified T.s. as organomata, histiomata, and cytomata, according to whether they consist of organs, tissues, or cells. These groups are subdivided into connective-tissue T.s and epithelial T.s, and still further as fibromata, myomata, osteomata, chondromata, etc., according to the nature of the structures involved. Adams has introduced a classification based on the embryological development of the cells. See also CANCER.

Tumult, see RIOT.

Tumulus (from Latin *tumere*, to swell), an ancient grave-mound. See BARROWS.

Tun (weight), see METROLOGY.

Tunbridge, see TONBRIDGE.

Tunbridge Wells, royal municipal bor. and health resort of Kent, England, 5 m. S. of Tonbridge (after which it is named) and 35 m. from London. Its mild chalybeate springs, discovered in 1606 by Lord North, made it a popular resort in the 17th and 18th cents. Places of interest are the covered promenade called The Pantiles, at the end of which are the springs; and the par. church of King Charles the Martyr. Since 1909 the tn has been entitled to incorporate the word 'Royal' in its title. The tn was also famed for its local industry of Tunbridge Ware (wood-mosaic). A co. cricket week is held here, and there are golf links and other games facilities. T. W. sands is the name given to a subdiv. of the Wealden Beds of the S. of England, varying in thickness from 150 to 400 ft. Pop. 38,397. See Margaret Barton, *Tunbridge Wells*, 1937; J. C. M. Given, *Royal Tunbridge Wells—Past and Present*, 1946.

Tundra, term applied to a geographical region in N. Russia and Siberia, but now generic for all such regions, e.g. the barren lands of Canada. Primarily, it is a region which by reason of high lat. and consequent inclement climate is almost destitute of trees. The soil is completely frozen, except for a depth of a ft or two during summer, at which season the surface water forms pools, lakes, and marshes, the formation of which has been largely determined in the larger features by the ice cap extending over it during the glacial age. The vegetation is stunted and scanty, consisting of mosses, lichens, dwarf birch, and willow, and an 'Alpine' flora. Except for the reindeer or caribou and musk-ox, the fauna consists of small furred animals, whose skins are sought by hunters and trappers.

Tung (or Chinese Wood) Oil is obtained from the nut kernel of 2 trees, *Aleurites Fordii* and *Montana*, indigenous to SE. China, Indo-China, and the Shan States of Burma, and now cultivated in many parts of the world, notably the *Fordii* variety in the U.S.A., Argentina, Paraguay, and Brazil. The *Montana* variety has also been widely planted in Nyasaland. Oil content of the kernels is: *Fordii*, 40–58 per cent; *Montana*, 51–67 per cent. China is the prin. source of T. O., where production is by expression by primitive methods from fruit gathered from wild trees. In the U.S.A. and S. America the kernels are dried, crushed, and pressed without cooking, chiefly in continuous screw presses or 'expellers' to produce oil of very high quality. T. O. is generally pale yellow in colour, but also appears on the market in various grades ranging from clear or 'white' for best quality to yellow, red and black, etc., for the lower grades; it has a characteristic odour and is thick and viscous. Like linseed oil, it is used almost exclusively in the manuf. of paints, varnishes, proofed fabrics, etc. It is unique among drying oils in containing a very high percentage of alpha-elacostearic acid, a conjugated

triene acid, which makes the oil polymerise very rapidly by autoxidation or when subjected to heat. The Montana variety contains less than Fordii, and is less valuable commercially. It used as the sole drying oil in a paint it forms a wrinkled film, due to its high rate of drying and peculiarities of volume change; consequently it is used mainly in conjunction with other oils, usually linseed oil, and is cooked with soya-bean and other semi-drying oils to improve their drying properties. When heated either alone or in the presence of phenolic resins varnishes are produced that give clear films on drying. They are still somewhat sensitive to an impure atmosphere, however, giving wrinkled films—a phenomenon known as 'gas checking'. The formation of a wrinkled film on drying is sometimes made use of in the production of paints to give a 'crinkle' or 'crackle' finish. Component fatty acids of the oil are—saturated: total 3-7 per cent; unsaturated: oleic 1-16 per cent; elaeostearic 75-85 per cent. The press cake is poisonous, and is only used as a manure.

Tungshan, see HSUCHOW.

Tungsten, symbol W, atomic number 74, atomic weight 184, a metallic element which occurs in nature as wolframite (iron tungstate), scheelinite (lead tungstate), and wolfram ochre (T. trioxide). The metal can be obtained by reducing the trioxide on charcoal with hydrogen. It is a hard grey metal (melting point about 3390° C., sp. gr. 19.3). It forms 3 oxides: WO_3 , basic and a reducing agent; W_2O_5 , blue in colour; and yellow, WO_2 , which gives rise to the tungstates when treated with alkalis. Tungstic acid, H_2WO_4 , is made by the action of acids on tungstates. The chlorides of the element are decomposed by water. T. is used largely for electric-lamp and thermionic-valve filaments. These filaments may be made: (a) by drawing tungsten rods at 2000° C.; (b) by compression of a mixture of T. powder and an organic compound, carbonising, heating, and then shaping into the required form; (c) by heating a carbon filament in the vapour of T. oxychloride and hydrogen, when T. deposits on the carbon centre. Compounds of T. are also used for making ceramic glazes, and fire-proofing.

Alloys. T. alloys well with aluminium and with chromium. Well-known steels containing T. are characterised by being very strong and hard, and not losing the 'temper' when heated. They are especially valuable for high-speed cutting tools. Such steels contain T. 15-20 per cent.

Tungurahua. 1. Prov. of central Ecuador, crossed by the E. Cordillera of the Andes, bordered by the provs. of Chimborazo, Bolivar, Leon, and Oriente. The cap. is Ambata. Area 1685 sq. m.; pop. 204,620.

2. Active volcano of Ecuador, in the S. of T. prov. It rises to 16,700 ft among the Andes (q.v.). In Aug. 1949 the volcano erupted and the prov. was severely shaken by an earthquake, which

struck the tns of Ambato, Guano, Pelileo, Patate, and Pillare.

Tungus (or **T-Manchu**) Languages, group of related languages spoken in E. Asia. They include those of the Evenki (q.v.), a number of small peoples in the Russian Far E., and the Manchurians. T. L. belong, together with the Turkic and Mongol languages, to the Altaic family. See URAL-ALTAIC LANGUAGES.

Tunhuang, see CAVES OF A THOUSAND BUDDHAS.

Tunic (Lat. *tunica*, corresponding to the Gk *chiton*), a long, white shirt-like garment with short sleeves, worn by the ancients; in female attire it reached to the ankles, but for men it was somewhat shorter. Over it men wore the *toga* (q.v.) on formal occasions, and women the *palla*. The ornamented *tunica palmata* was worn by the gen. at his triumph. Senators wore the *tunica laticlava*, with a double purple stripe down the front; the *tunica angusticlava* of knights was similar, but had single narrow stripes, and came into common use. The word T. is now applied to any tight-fitting jacket, particularly to that of the military uniform.

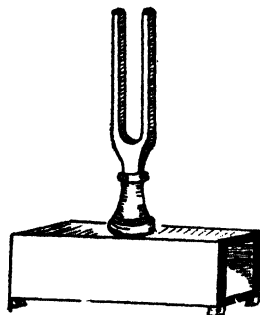
Tunica, co. of Mississippi, U.S.A. Its Negro pop. is 85½ per cent of the whole, the highest of any co. in the U.S.A. Pop. 21,700.

Tunicata, class of protochordate animals consisting of about 700 species, all of which are marine. At some stage in their life, gill slits are developed and the larvae usually have a tail supported by a notochord. The class consists of the Ascidacea, sea-squirts; Larvacea, appendicularians; and the Thaliacea. The ascidians are sessile creatures, attached to rocks, weeds, etc., with a pharynx divided by gill-clefts which open into an atrium with an upper exhalant aperture. There is a free-swimming, tailed, larval (tadpole) stage. The Larvacea are tailed, pelagic tunicates which live in a remarkable house fitted with an elaborate filtering mechanism for straining off very small planktonic organisms which are their food. The Thaliacea are also pelagic and are divided into the Pyrosomida, Dolioidea, and Solpida. The Pyrosomas are colonial tunicates with the zooids embedded in a hollow, gelatinous tube closed at one end. The tubes vary in length from an inch or so to sev. ft. The colonies are highly phosphorescent. The dolioidea and salps are transparent, gelatinous, cylindrical, or barrel-shaped tunicates with a branchial and an atrial chamber. They swim by means of the contractions of muscle bands which encircle the body and which force out jets of water. See also LARVACEA, ASCIDIACEA, and PYROSOMA.

Tuniele (Lat. *tunicella*), less ornate form of the dalmatic (*tunica dalmatica*) (q.v.), worn by sub-deacons as a liturgical vestment over the alb.

Tuning-fork, small instrument in the form of a fork with 2 long prongs invented in 1711 by John Shore. It not only retains pitch very accurately, but gives out a very pure sound free from harmonic

upper partials. It is often tuned to A above middle C which is used by orchestras as their fundamental tuning-note.



TUNING FORK

Tunis, cap. of Tunisia, stands on a bay of the same name, surrounded by lakes and marshes, 10 m. from the sea, and 275 m. NW. of Tripoli. Its port is Goletta, but a channel opened in 1893 has made



D. McLeish

TUNIS

The 11th-century mosque of El Ksar

T. directly accessible to ocean vessels. T. is a walled tn, and its harbour is well defended. In the centre of the old tn is the Medina, the focus of trade and industry, built mainly from the ruins of the tns of Thunes, Carthage, and Utica. The

new tn is European and E. of the Medina, and is rather unhealthily situated. Velvets, silks, linen, and fez caps are manufactured. There are many mosques, with a Mohammedan univ. in the Great Mosque, and the houses are nearly all built of stone. Pop. (1946): Muslim, 189,393; Jews, 34,193; French, 66,422; Italians, 46,629; Maltese, 4,312; others, 23,844. Total 364,593.

Tunisia, Republic of, in N. Africa, lies on the Mediterranean Sea between Algeria on the W. and Tripoli on the E., with an area of 48,253 sq. in., including that portion of the Sahara lying E. of the Beled Djerid, extending towards Gadamès. The pop. is estimated as follows: 239,549 Europeans (exclusive of armed forces), divided between 143,977 French, 84,935 Italians, 6459 Maltese, and 4178 others; 2,903,949 natives, comprising 2,832,978 Arabs and 70,971 Bedouins. As no census has been taken since 1946, natural increase as well as political factors require these figures to be treated with reserve. The surface is mountainous in the interior. The region in the neighbourhood of the Mediterranean coast is fairly well watered and fertile, but towards the central table-land, bordering on the Sahara, the soil is very poor, and the dry climate makes cultivation difficult. The climate is continental. The greater part of T. is useless for agriculture, but the rest is fertile and the natives are hard-working. The chief industry is agriculture, the prin. products being wheat, barley, oats, maize, sorghum, chick-peas, potatoes, dates, almonds, oranges, lemons, shaddock, alfalfa grass, cork, pistachios, and henna. Much wine is made, and olive oil is produced. Though the native wool is of an inferior quality, the Algerian sheep have been acclimatised. The breed of horses is steadily improving, and pigs are profitable. The mineral resources are being developed, and lead ore, zinc ore, phosphates, the output of which increases yearly, and iron are worked. Lignite and particularly manganese mines are developing rapidly, and bronze is manuf. Phosphates and marble are also worked. The chief ports are Tunis, Sfax, and Bizerta, while there is good harbourage at Gabès and Susa. The native industries include spinning and weaving wool for garments, leather embroidery, saddlery, pottery, slipper making, and matting. The fisheries (tunny, sardines, anchovies) are also important, being mainly in the hands of the Tunisians, Greeks, Maltese, and Italians. T.'s import and export trade is done largely with France. France took 60 per cent of all Tunisian exports in 1954, and 70 per cent of total imports were from France. A customs union with France was signed in 1955. The official language is Arabic. The chief tns are Tunis, Bizerta, Sfax, Sousse, Kairouan, and Gabès (qq.v.).

History. (For the beginnings of Tunisian hist. see CARTHAGE; PHOENICIA.) Modern T. is roughly co-extensive with the Rom prov. of Africa as first constituted after the third Punic War. This prov. was created c. 146 bc; it was

bounded on the W. by Numidia, on the N. and E. by the Mediterranean, and on the S. (approximately) by the 35th parallel. It was extremely fertile, and soon became one of the prin. sources of the Rom. corn supply. There were many flourishing towns, of which the chief were Utica, Hadrumetum, and Thapsus. The old Punic language was retained by the native pop., but in other respects the prov. was quickly Romanised. Between the date of its foundation and the reign of Septimius Severus (AD 193-211) its boundaries varied considerably from time to time. Together with most of Rom. Africa it was overrun by the Vandals in 439, but became part of the Byzantine Empire when recaptured by Belisarius (q.v.) in 533-4. It was lost in the next cent. to the Arabs, who completed their conquest in 698 after repeated attacks over 50 years. Latin and Christian civilisation was soon displaced by that of Islam. In the early history of Latin Christianity the prov. was more important than Italy (see AUGUSTINE; CYPRIAN; TERTULLIAN).

For the next 900 years T. was ruled in effect by the Berbers of the hinterland (who had never been christianised and who were early converted to Islam) nominally under the Arabs. The Fatimite (q.v.) dynasty of Arabs extended their rule along the whole of N. Africa from 909 to 1171. In the mid-11th cent. a quarrel between the Berber ruling house in T. with the Fatimites, resulted in the latter letting loose upon N. Africa a great horde of Bedouins, whose violent and predatory habits became endemic in the area for hundreds of years. There was an interregnum of Norman rule from 1148 to 1160, when the Almohade Arabian dynasty, successors of the Fatimites, drove out the Normans, to be succeeded in 1336 by the Hafside, a Berber, dynasty. The spread of Turkish power brought the dynasty to an end in 1575, and descendants of a 17th cent. Turkish ruler remained beys of T. until it became a rep. Intermittent hostility with Algeria marked the rule of the beys, and moreover, T. became a pirate state, deriving most of its public revenue from depredations upon shipping in the Mediterranean. The cessation of piracy early in the 19th cent. had a profound effect upon the economy, and governmental inadequacy was such that only a mere fraction of fertile land was under cultivation.

Meanwhile T. had become a centre of European interests and rivalries: Italy had been sending colonists, the French were interested because it lay next to Algeria, and there was the possibility of a Brit. protectorate when the bey turned to Great Britain in the 1870s. The country had gone bankrupt in 1869, and a triple control—Brit., It., and Fr.—was set up over the finances. The It. purchase of the Brit. railway line exacerbated Franco-It. rivalry, and under the pretext of punishing certain tribes the French, by military action begun in 1881, forced the bey to recognise a Fr. protectorate which was formally estab. in 1883. The ad-

ministration was reformed; but throughout the hist. of the protectorate the French have had to deal with nationalist movements. T. was an important theatre of operations in the Second World War (see NORTH AFRICA, SECOND WORLD WAR, CAMPAIGNS IN). In the confused period following the Allied victory in N. Africa the French deposed the bey, whom they accused, without proof, of collaboration with the Axis powers, and placed a member of his family on the throne. Nationalist agitation was resumed. In Mar. 1956 France recognised the independence of T. by protocol. Following a general election, a Constituent Assembly met for the first time on 18 April, and elected as president and Prime Minister Habib Bourguiba, leader of the nationalist Neo-Dastur party. T. was proclaimed a rep. on 25 July 1957, and Bourguiba became head of state with the title of President, thus bringing to an end the Husseinite dynasty, which had reigned since the beginning of the 18th cent. In the early months of 1958 tension considerably increased between T. and the Fr. military command in Algeria, following on the bombing of the Tunisian vil. of Sakiet in Feb.

See N. Fauçon, *La Tunisie avant et depuis l'occupation française*, 1893; M. Besnier, *La Tunisie au début du XX siècle*, 1904; J. L. de Lanessan, *La Tunisie*, 1917; M. Monmarché, *Algérie-Tunisie*, 1927; W. B. Worsfold, *France in Tunis and Algeria*, 1930; A. Violis, *Notre Tunisie*, 1939; L. Laitman, *Tunisia Today*, 1954.

Tunja, tn. of Colombia, cap. of the dept of Boyacá about 100 m. NE. of Bogotá at an altitude of 9252 ft above sea-level. It is one of the oldest Sp. tns of the New World and contains some buildings of colonial days of which the 17th-cent. church of Santo Domingo is a fine example. It is connected by rail and road with Bogotá and is an agric. and mining community. Pop. 27,380.

Tunkers, see DUNKERS.

Tunnelling. The technique of T. in rock has advanced considerably during the last few decades, particularly in methods of blasting, debris loading, and lining. The difficulties naturally increase with the size, length, and depth of tunnel, but with the mechanical appliances now available no serious limitations are imposed. Granite or other hard rock presents little difficulty to modern power drills. The old method of hand drilling is now almost entirely superseded by power drilling in all tunnels of any appreciable length.

An important preliminary operation is the survey work. The centre-line of the tunnel is ranged out on the surface and a series of shafts are sunk, from 100 to 300 yds apart along the line. To transfer this line underground, 2 marks are made in the cross-timbers, in the centre-line, at the bottom of each shaft and prolonged in both directions when the tunnel is being opened out. When the tunnels are of great length, such as those of the Alps, and can only be driven from the ends,

the setting out is much more difficult. In this case the centre-line is determined by a triangulation survey, and ranged out from marked bases.

Small-section tunnels are usually driven from one end to the other at their full dimensions. Large-section tunnels are often driven in 2 stages: a pilot heading is excavated in advance which is afterwards enlarged to the full section of the main tunnel.

The normal procedure in T. in rock is as follows. Power drills are used to bore successive rounds of holes in the face. Each round is fired and the broken rock removed by hand shovels or mechanical loaders. The section is trimmed to its proper size by further blasting or by pneumatic picks, and timber or steel supports erected. Sometimes side and top lagging boards are required. In loose ground the top laggings are driven in advance of the last supporting set (fore-polling) before the debris is removed. In sand or gravel the problem is one of support rather than excavation, and fore-polling is necessary. The poling pieces are driven along the sides and top of the tunnel to protect the men from sudden falls or 'runs' of ground.

T. in heavily watered rocks or clay is sometimes done with the Greathead shield. This consists of a ring of steel which is forced forward by hydraulic rams, the piston heads bearing against the cast-iron lining previously set behind. Gravel and sand are usually drained before excavation. The cementation process has been employed successfully for dealing with water from rock fissures. The process consists in injecting liquid cement, at high pressure, through advance boreholes into the water-bearing fissures. The holes radiate outwards so as to intersect fissures on the outside of the tunnel area. After the cement has set and the water been sealed off the tunnel is excavated and lined in the ordinary way. A second length is then cemented, excavated, lined, and so on until the water-bearing deposit has been passed.

In hard rock blasting is necessary to break down the material. The blasting holes are usually from 6 to 8 ft long, but in some recent tunnels, 14-ft and 15-ft lengths have been adopted. The explosive often used is 60 per cent low-freezing gelatine and sometimes stronger up to 80 per cent. Liquid air or liquid oxygen has been used as an explosive, and has the advantage of leaving no blasting fumes. The recently introduced *delay action firing* for T. work, possesses many advantages over ordinary electric firing. The various shots in the tunnel face, constituting the complete round, explode either instantaneously or with a time lag of 2, 3, or 4 sec. according to their position in the rock face. Delay-action firing produces a large heap of well-broken rock which can be efficiently dealt with by power loaders. Ventilation is provided by means of a 15-, 18-, or 20-in. forcing fan delivering through air tubes to the tunnel face. The vol. of ventilation required depends upon the length

and size of tunnel and the presence of harmful gases or fumes. The problem of dust suppression is also given close attention on account of the danger of lung ailments, such as silicosis. Wet boring is done in practically all dry tunnels and the broken rock is copiously sprayed during loading.

Rings of reinforced concrete are gradually superseding cast-iron rings as tunnel supports. The concrete segments are bolted together as with cast-iron segments, but the former possess the advantage of being lighter.

In rock T., the average advance ranges from 4 to 8 ft per cut or blasting round and from 25 to 100 ft drive per working face per week, though these rates have in cases been much exceeded. The Florence Lake tunnel (15 ft diameter), California, constructed in 1920, is 13 m. long; there were 6 working faces, the blasting holes were 18 ft long; the average travel at each face was 125 ft a week, so the total travel was 750 ft a week or nearly 7 m. a year. Among recent Brit. tunnels, that of the Lochaber power scheme, completed in 1930, was 15 m. in length. It was excavated through igneous rock from 22 working faces, and the maximum weekly advance at any face was 91 ft. The Mersey tunnel is one of the largest underwater roads for traffic in the world. It was commenced in Dec. 1925 and completed in 1934.

The Channel Tunnel Scheme, see CHANNEL TUNNEL.

See R. W. Richardson and R. S. Mayo, *Practical Tunnel Driving*, 1901; W. T. Halcrow, *A Century of Tunnelling* (Thomas Hawksley Lecture), Inst. Mech. Engineers, 1942.

Tunney, 'Gene' (real name, **James Joseph**), (1897-). Amer. boxer. At Philadelphia, 23 Sept. 1926, in view of the largest crowd ever gathered at a boxing contest, he defeated Dempsey, holder of the world-championship, in ten rounds. He defeated Dempsey again, not so decisively, at Chicago in 1927. In 1928 he defeated Heeney at New York, married, and retired from the ring.

Tunny (*Thunnus thynnus*), large teleostean fish of the family Scombridae, allied to the mackerel. It is abundant in the Mediterranean, where its fishery has been an industry since ancient times, and is also found in the Indian, Pacific, and Atlantic oceans. It attains a length of 12 ft and a weight of 1500 lb., and T.-fishing is a popular, but expensive, sport. T. is used for food.

Tunstall, Cuthbert (1474-1559), Eng. bishop and scholar. He studied at Oxford, Cambridge, and Padua. He held sev. livings, was Master of the Rolls, dean of Salisbury, Bishop of London (1522), then of Durham (1530), and keeper of the Privy Seal (1523). He was employed by Wolsey and Henry VIII on various diplomatic missions abroad, and was a friend of Erasmus. T. was a traditionalist in religious matters and although he accepted Henry VIII as head of the Church in England, he was opposed to the eccles. changes under Edward VI.

He was imprisoned and later deprived of his see. This was restored to him under Mary, but he refused to take the oath of supremacy to Elizabeth, and was deprived again, 1559. He wrote numerous religious works.

Tunstall, formerly tn of Staffordshire, England, 3½ m. from Newcastle under Lyme, and now joined to the co. bor. of Stoke-on-Trent (q.v.) since 1910, with important manufs. of pottery and china.

Tupi-Guarani, 2 important tribes of S. Amer. aborigines, extending from the Amazon to the Lower Paraguay and the Peruvian Andes. At one time there were numerous Jesuit missions, especially among the Guarani. A corruption of the Tupi language is spoken as the trade medium in the Amazon region. The Tupian tribes surpassed the other Brazilian aborigines in culture and civilisation. The Indians of Paraguay belong to the linguistic family of the T.-G., which is believed to have originated in the basin of the Paraguay and to have spread from the centre over much of S. America E. of the Andes. The Guarani make up most of the coastal people of Brazil to-day; and even well in the interior of the Amazon country tribes speaking this same language are to be found. The Guarani language is still the popular language of Paraguay, and many of the place-names of this part of S. America, including S. Brazil, are Tupi or Guarani words. See P. E. James, *Latin America*, 1950. See also GUARANI.

Tupper, Sir Charles (1821-1915), Canadian statesman, b. Amherst, Nova Scotia. He studied medicine at Edinburgh and practised in his native tn. He was premier of Nova Scotia in 1864-7, and in that role played a leading part in bringing his prov. into the confederation. Bad feeling between him and Joseph Howe drove the latter into opposition to confederation. But T., as a member of Macdonald's first dominion Cabinet, drew the sting from Nova Scotia's secession by persuading Howe to join the dominion gov. T. was minister of revenue and then of customs, 1872-3, and minister of public works in 1878. He was sent to London, 1884, as 'Canadian High Commissioner,' but was treated more like a colonial agent. In 1896 he became Prime Minister of Canada, succeeding Sir Mackenzie Bowell, holding that office for 6 months. He pub. *Recollections of Sixty Years*, 1914. See life by E. M. Saunders, 1916.

Tupper, Martin Farquhar (1810-89), versifier, b. London. Educ. at Charterhouse and Oxford, he studied law but turned to writing. His *Proverbial Philosophy*, 1838, had a great vogue, especially in America, where a million copies were sold. It is a collection of commonplace observations put in rhythmical form, and has long since lost its undeserved popularity. T. wrote some 40 works, including a biography, *My Life as an Author*, 1886. See studies by R. Buchman, 1941, and D. Hudson, 1948.

Tura, Russian settlement in the Krasnoyarsk Kray of Siberia, on the

Lower Tunguska R., cap. of the Evenki (q.v.) Nat. Dist. Pop. (1956) 2000.

Turanian, *Tûrân*, Iranian term, was the name given by the Persians to the region situated to the N. of Amu-Darya (Oxus), roughly corresponding with modern Turkestan, which means 'the country of the Turks.' Medieval Arab geographers from the 11th cent. onwards used the name *Tûrân* to indicate the region of contemporary Turkestan and its inhab.; in much later cents. the same term was employed by Europeans not only for Turkestan, but also for all Central Asia. In the 19th cent., the term 'Turanian' as an ethnical and philological term, was applied to the Turks and Mongolians, and their languages, as well as to Scythians, Huns, Avars, Finns, Estonians, Hungarians, and Bulgarians, and others. Thus, roughly speaking, the term 'Turanian Languages' became synonymous with the Ural-Altai (see URAL-ALTAIC LINGUISTIC FAMILY), consisting of the Finno-Ugrian and the Altaic linguistic sub-families (see LINGUISTIC FAMILIES). The term 'Turanian' is now obsolete.

Turba, see TARDES; TERUEL.

Turban, head-dress of males of Muslim races, of very ant. origin, consisting of long pieces of fine linen, muslin, taffeta, or silk, coiled and twisted round the head, a fez (q.v.) or tarbush sometimes forming the foundation. It is worn by all classes and varies in size and material according to the occupation, rank, or country of the wearer.

Turbary. In law, *common of Turbary* is the right which a tenant enjoys of digging turf from the waste lands of a manor (see COMMON, RIGHT OF).

Turbellaria, see PLATYHELMINTHES.

Turberville or Turberville, George (c. 1540-1610), poet, b. Whitechurch, Dorset. Educ. at Winchester and Oxford, he became secretary to Thomas Randolph, ambas. to Russia. In 1567 he pub. *Epitaphes, Epigrams, Songs and Sonets*. He also wrote *The Booke of Faulconrie* and *The Noble Art of Venerie*, 1575, and was one of the first to use blank verse.

Turbine, Gas see JET PROPULSION

AERO-ENGINES.

Turbines, Hydraulic, see HYDRO-ELECTRIC POWER.

Turbines, Steam. The turbine differs fundamentally from the reciprocating engine both in thermodynamical and mechanical action. In the reciprocating engine it is the pressure of the steam that constitutes the main driving force on the piston in the cylinders, and the steam leaves the cylinder at atmospheric or condenser pressure. The fact that in the expansive engine the steam is allowed to expand towards the end of the stroke does not invalidate the statement. In the turbine the steam expands in the nozzle before reaching the moving part, the blades, and part of the total heat content, or enthalpy, is converted into kinetic energy, i.e. the steam acquires velocity and streams at high speed into the blades, where it is deflected by the shape of the blade, thus suffering a change in momentum, equivalent to an impulse imparted

to the blade, which is the driving force. Sometimes a further expansion takes place in the blade (see below *Impulse-Reaction Turbines*). In the reciprocating engine, again, the pressure acting alternately on one side or the other of the piston generates a linear to-and-fro motion which has to be transformed into rotation, for driving a machine, by connecting-rod and crank pin, and the pull or push of the connecting-rod does not produce a uniform torque (turning momentum) on the shaft; a flywheel is necessary for carrying the rotation over the dead points and for smoothing the motion. Moreover, complicated valve-gear is required for directing the flow of steam alternately to one end or other of the cylinder. In the turbine, steam is admitted at a uniform rate to the blades fixed on the rotor, and a very smooth rotary motion is immediately produced. No flywheel is required, and the consequent reduction in weight of the complete engine is important in all applications; the absence of reciprocating motion is another factor making for lighter foundation work.

THEORY. Let the total heat (enthalpy) of 1 lb. of steam entering the nozzle be J_1 lb. ft, where J is Joule's equivalent (778.3 in recent steam tables). If the steam expands, with loss of heat to a value I_1 , on leaving the nozzle, the heat converted into kinetic energy is $J(I_1 - I_2)$ lb. ft. If the initial velocity of the steam is negligible in comparison with the final velocity v , which is usually the case, the kinetic energy generated is $\frac{v^2}{2g} = J(I_1 - I_2)$, and the steam velocity is $v = \sqrt{2gJ(I_1 - I_2)}$. If the pressure and temperature of the steam is known, the

section in the blade determines the blade speed (Fig. 1). The latter therefore depends on nozzle and blade design, and the most efficient blade speed is a certain fraction of the steam velocity, whose value varies for different types of turbine. When the initial and final pressure and the temperature of the steam are known, the work done by the turbine per lb. of steam can be calculated, assuming adiabatic expansion, and, evaluating the external heat applied to generate the steam, the theoretical thermal efficiency can be found. For these calculations the Mollier diagram is convenient, though use of the steam-table numerical data gives a more accurate result.

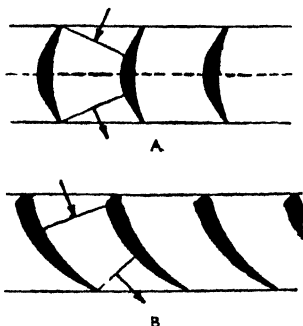


FIG. 1. TURBINE BLADING

A, impulse; B, impulse-reaction.

velocity can be calculated from data given in steam tables or from the Mollier entropy-enthalpy diagram. In a simple impulse turbine the velocity works out at about 3500 ft/sec. Now the steam does not flow out of the nozzle tangentially to the rotor periphery, but at an angle to the tangent, and the impulse due to de-

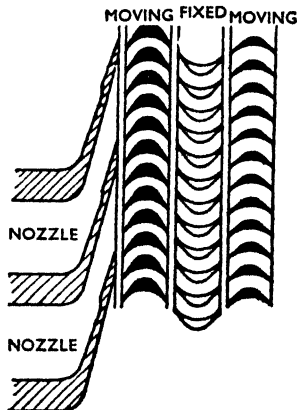


FIG. 2. IMPULSE TURBINES

Impulse Turbines. In the simple impulse turbine there is one set of nozzles fixed on the inner surface of the cylinder or casing, and one rotor carrying a single row of blades as shown in the left half of the developed diagram (Fig. 2). The nozzles usually converge into a throat from which they widen out to the exit. The steam pressure falls in the nozzle to exhaust pressure, the steam enters the blade at high speed, is deflected, and thereby gives an impulse to the blade, issuing with a 'leaving' velocity which is about $\frac{1}{2}$ of the initial value. This represents a loss of energy of 11 per cent, the energy being proportional to (velocity)². The loss can be partly recovered by passing the leaving steam through a set of redirecting fixed blades (Fig. 2) into a second row of blades on the rotor, which is then commonly known as a 2-row wheel. The 'leaving loss' may thus be reduced to 2 per cent. Sometimes a 3-row wheel is used with 2 sets of guide vanes, but the 2-row wheel is more efficient. The simple impulse turbine (de Laval) has a very high speed, up to 30,000 r.p.m., and is usually employed with reduction gearing. The most efficient blade velocity is about $\frac{1}{2}$ the steam velocity, but as the expansion takes

place in one set of nozzles, the steam velocity is very high, about 3500 ft/sec. and the max. practicable blade speed is about 1400 ft/sec. The 2-row velocity compounded (Curtis) turbine is also a high-speed engine, but its efficiency is higher than that of the simple turbine. The most efficient blade speed is about $\frac{1}{2}$ of the steam velocity. Velocity-compounding is often incorporated in other types of turbine. In the pressure-compounded impulse turbine the expansion of the steam is divided between a number of 'stages,' sets of nozzles, or diaphragms, interposed between blade-carrying rotors. In this way the steam velocity is considerably reduced. The pressures of steam on the 2 sides of a diaphragm being different, there is a certain leakage loss. The Parsons and Marine Engineering Turbine Research and Development Association (Pametrad) has recently (1955) developed an impulse turbine using steam at much higher temperature and pressure in a single stage. This has made possible a 30 per cent reduction in weight, a 15 per cent increase in fuel efficiency, and a 15 per cent cut in cost. The weight of gearing is halved.

Impulse-Reaction Turbines. The pure-reaction turbine in which steam expands wholly in the moving element and issues at high speed from a nozzle, thereby imparting a recoil velocity to the nozzle, has never passed the experimental stage. The impulse-reaction turbine is often incorrectly called a reaction turbine. In the impulse-reaction (Parsons) turbine the nozzles are replaced by fixed blades similar in shape to the moving blades and equal in number (Fig. 3). Steam is

row being fixed, they are allowed to rotate in the opposite sense to even rows; the steam velocity may thus be doubled without any excessive speed being required by the blades to ensure high efficiency, since the relative velocity of one set of blades with respect to the other set is twice its absolute velocity.

Reheating. As steam expands through a turbine it first loses superheat, and then becomes wet. A small degree of wetness in the last few stages is unimportant, as the water has no time to separate out before it reaches the condenser. With a high degree of wetness, however, the unyielding drops of water strike the entering edges of the blades at a high relative velocity, and rapidly wear them away (erosion). Using steam at low or normal pressures, condensation can be reduced by adopting very high superheat temps.; but the materials employed in superheater and turbine construction, which rapidly lose strength above 500° C. (dull red heat), put a limit to this. With high pressure (500–1500 lb/sq. in.), even steam at red heat will not prevent condensation, and in sev. large modern turbines, therefore, steam is withdrawn after partial expansion and reheated in a reuperheater (combined with the boiler or separately fired) before being returned to the turbine. This eliminates condensation, and so enables high-pressure steam to be used. For reheating, multi-cylinder turbines are usual, the steam being reheated between the h.p. and l.p. cylinders.

Sources of Loss. (1) Friction. Steam passing through the blading and nozzles of a turbine at high speed is retarded by friction, and the full theoretical velocity is not obtained. To minimise this loss, modern turbines have a large number of stages, and small steam velocities in each stage. Blades are made of stainless steel and finished smooth; any pitting or corrosion in service greatly increases frictional losses. (2) Eddies are set up at the blades if the entering edges are eroded, or if the steam strikes them at a slightly wrong velocity or angle. This may occur if the boiler is not giving its full superheat temp. so that the calculated heat drop is not obtained; or, in the final stages, if the condenser circulating water is colder than usual (perhaps due to a frost). Eddies are so much wasted energy, as the steam velocity in them is dissipated in friction. Both friction and eddies make the steam slightly hotter and drier at each stage than it theoretically should be (friction being a transformation of mechanical energy into heat), and condensation in the turbine is thereby delayed. (3) Leakage of steam past the blade tips occurs only in reaction turbines (q.v.), and depends on how small the clearances between fixed and moving blades can be made; it can never be entirely eliminated. (4) Leakage of steam through the packing occurs at the high-pressure gland, where the shaft passes through the casing, and also (in impulse turbines) at each nozzle-plate, where it meets the rotor. At the low-pressure gland, the turbine is at condenser pressure

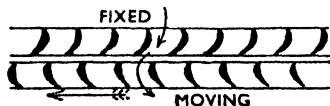


FIG. 3

FIG. 3. IMPULSE-REACTION TURBINE

admitted all round the circumference of the cylinder. The steam expands as usual in the fixed blades and enters the moving blades at high velocity, being deflected and giving an impulse to the blades; but a further expansion takes place in the moving blades, and the velocity thus generated imparts a recoil or reaction to the blades, and the driving force is the vector sum or resultant of the impulse and reaction components. Steam velocity is moderate and blade velocity is nearly equal to steam velocity. Owing to the pressure differences throughout the successive rows of fixed and moving blades, there is some leakage loss, especially at the high-pressure stages, and blade edges should be sharp and well-fitting.

Double-motion Turbines. In the Ljungström turbine the blades are arranged in concentric rows and fixed on separate disks. Instead of the first, third, etc.,

(sub-atmospheric), and consequently air leaks inwards. The air pump must therefore be made larger (see *Forms of Condenser* below), and so absorbs more power. (5) Residual velocity. The steam leaving the last row of blades has a certain velocity, corresponding to a small amount of energy in the steam; this is not transferred to the rotor, and so is counted as a loss. (6) Supersaturation. Steam passes so rapidly through a turbine ($\frac{1}{20}$ sec. or less) that water has no time to separate out at the condensation point, and the steam becomes super-saturated; in this state it is cooled below its normal temp., and so has less energy to impart to the blades. The lost energy is evolved later as heat in the condenser, where it is not wanted. A compensating advantage is that erosion is somewhat reduced. (7) Radiation is reduced by careful lagging of all parts. In land turbine plant of 3000 h.p. and over, these losses reduce the actual turbine efficiency to 80-85 per cent of the theoretical. With marine turbines, which work under less favourable conditions, and smaller land turbines (down to 300 h.p.), where the losses are greater in proportion, the efficiency may fall to 60 per cent of the theoretical.

THE EXHAUST FROM A TURBINE. *Advantages of Condensing.* There is almost as much energy in a lb. of steam expanding from 5 to 4 lb./sq. in. pressure as in a lb. of steam expanding from 500 to 450 lb./sq. in. a pressure drop 50 times as great. For, although the pressure is very low (sub-atmospheric), the vol. of the steam is enormous, and work done is measured by pressure \times vol. These large stores of energy cannot be used in reciprocating engines, as cylinders cannot be made large enough to deal with it (see *STEAM ENGINES (THEORY)—Sources of Loss*); but the final or low-pressure rows of turbine blades can be made as large as required; and if one row is insufficient the steam flow can be divided a few stages before exhaust, and made to pass through 2 or more low-pressure sections in parallel (multiple exhaust). The steam turbine is most efficient at the low-pressure end; at high pressures, a piston and cylinder may even be preferable. But these low sub-atmospheric pressures cannot be attained without condensing the exhaust steam, and the lower the exhaust pressure, the larger the condenser. Thus the condenser—a minor auxiliary in reciprocating steam engines—becomes a vital component in S.T. practice, ranking in importance with the boilers and the turbine itself, and often occupying a greater space than the turbine it serves.

Forms of Condenser. These are usually of the surface type (see *STEAM ENGINES (FORMS)—Condensing Engines*), consisting of a large vessel of cast iron or mild-steel plate, closed at the ends by 2 tube plates of brass (or occasionally steel), and traversed by a large number of brass tubes (see Fig. 4); cold water (circulating water) passes through the tubes, on the outside of which the exhaust steam is condensed. The condensed water (condensate) drips off the tubes, and is withdrawn from the

bottom of the condenser by a small rotary or reciprocating pump, which delivers it to a hot well for feeding to the boilers. The air and other uncondensed vapours always present in steam, due to the leakage, etc.,

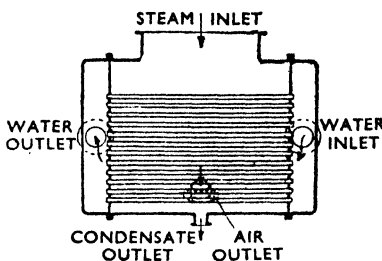


FIG. 4. CONDENSER

are extracted by a rotary air pump, or a steam or hydraulic ejector, through a separate outlet; the position of this varies in different types of condenser according to the direction in which the steam is required to flow. Steam always travels from the exhaust inlet, over the tubes to the air outlet, and this 'steam path' should be as short as possible, to reduce the pressure drop in the condenser. Without an air pump, the air would accumulate and mount up in pressure, and soon destroy the vacuum. The circulating water is forced through the condenser tubes by the circulating water pump; in land-turbine installations this water is usually obtained from, and passed back into, an adjacent river; in the absence of such, the circulating water, after traversing the condenser, is cooled in a cooling tower and used again. In marine practice sea-water is used. Condensers for S. T. give back pressures varying from 2 to $\frac{1}{2}$ lb./sq. in., corresponding to vacua of 26-29 in. (zero pressure = 30 in. vacuum).

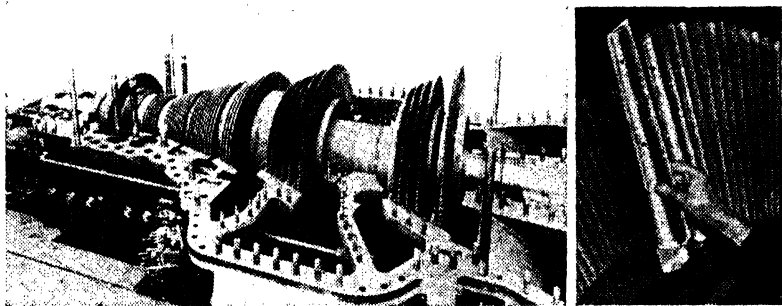
Back-Pressure Turbines, etc. Low-pressure steam for process work or heating, which must be uncontaminated by oil, can safely be taken from the exhaust or intermediate stages of a turbine. Turbines from which a part of the steam is withdrawn before exhaust, the rest being expanded to condenser vacuum, are called pass-out or extraction turbines; where all the steam is used, they are called back-pressure turbines. A small amount of steam is often passed out or 'bled' from ordinary turbines at different stages for heating the boiler feed water.

GOVERNING (see also *STEAM ENGINES, Governor*). Turbines driving electric alternators require very sensitive governors to keep the frequency of the electric supply constant; but they must also be able to shut off steam rapidly and completely in the event of a failure on the electrical side, otherwise the turbine will 'run away' when the load is suddenly removed by the circuit-breakers. In most turbines the main steam valve is operated

by oil under pressure supplied by a pump on the end of the turbine shaft. The governor, of the horizontal spring-controlled type, controls the supply of oil, and thus varies the steam supply as required. In case of failure an emergency governor, set at a slightly higher speed than the main governor, trips an emergency steam valve, which is normally kept open, against a powerful spring by a trigger; once tripped, this cannot be reset until the turbine has stopped. In reheating turbines, further rise of speed trips a valve between the resuperheater and the low-pressure cylinder, since the steam in the former may be sufficient to raise the turbine speed to a dangerous value, even when the main steam valve is closed. A fourth line of defence is a vacuum-breaking valve on the condenser.

Steam is admitted to the turbine at the first stage, with provision for overload by admission of additional steam at the sixth stage. The large increase in blade height in the final stages is noticeable, as also the divided exhaust in the last 2 stages to increase the exhaust blade area yet further (see *Forms of Condenser*). Steam is 'bled' from 4 points in the l.p. cylinder for feed-water heating. A central-flow condenser is fitted, mounted on springs which take the weight but allow the condenser to expand with the turbine cylinder.

Reaction Turbines. A large modern reaction turbine, built by Parsons & Co. Ltd., of Newcastle, for driving a 20,000-kW alternator (= 27,000 h.p.), has a single cylinder in 2 sections bolted together, the h.p. end of cast steel and



C. A. Parsons & Co. Ltd

SINGLE CYLINDER TURBINE WITH DUPLEX EXHAUST

On the right is shown the low-pressure turbine blades (integral type with erosion resisting shield) as used in the turbine illustrated.

EXAMPLES OF STEAM TURBINES. Impulse Turbines. A large modern impulse turbine, built by the Metropolitan-Vickers Electrical Co. Ltd., of Manchester, for driving a 50,000-kilowatt alternator (= 67,000 h.p.), has 2 cylinders to minimise expansion stresses; these can be very large when one end of a cylinder is at the temp. of highly super-heated steam (450° C. or over), and the other at the temp. of the condenser (down to 30° C.). The two rotors are mounted on separate bearings, and are connected by flexible couplings. The rotors consist of forged-steel disks pressed on a steel shaft, with blades of nickel steel or stainless steel. The high-pressure (h.p.) cylinder is of cast steel to withstand high temps. and pressures, while the low-pressure (l.p.) cylinder is of the cheaper cast iron. The h.p. turbine has 23 pressure stages, and the l.p. 18, without velocity compounding; this is a large number (some impulse turbines have only 4 pressure stages), but the modern tendency is to reduce the steam velocity by increasing the number of stages (see *Sources of Loss*).

the l.p. end of cast iron. There are 35 stages, of which the last 4 are duplicated (duplex exhaust); for overload, additional steam is admitted at the eighth stage; and steam is 'bled' at 2 points for feed-water heating. The rotor is a large, 1-piece steel forging, bored down the middle to reveal any interior flaws; the blades are of stainless steel, supported at their free circumference by a Monel-metal shroud ring. This is wider than the blades, and clears the adjacent blade rows by only a few thousandths of an in.; steam leakage past the blade tips is thus minimised. An adjustable thrust bearing is provided at the h.p. end of the rotor to adjust these clearances. The shroud ring is finished with a sharp edge, which, in case of fouling, merely becomes blunted without damaging the rest of the turbine. The end thrust on the rotor is balanced by 2 dummy pistons at the h.p. end; in large multi-cylinder reaction turbines the steam from the h.p. cylinder is often led to the middle of the l.p. cylinder and expanded in both directions, exhausting at the two ends into 2 separate condensers; thus the exhaust area is doubled compared with

a single-cylinder machine, and the i.p. rotor is balanced and needs no dummy pistons.

Double-rotation Turbines. A turbine built by Ljungström drives 2 25,000-kW alternators (= 67,000 h.p. in all) by 2 disk-shaped rotors, mounted face to face and rotating in opposite directions and connected in parallel. In the space between the rotors are 36 concentric rings or rows of reaction blading, attached alternately to each rotor by special expansion rings; there are also 4 ordinary rows of blades, 2 on each rotor, mounted in the usual manner. This may be called a 20-stage machine, with duplex exhaust in the last 2 stages. Steam is admitted to the centre of the turbine between the rotors, and expands radially outwards; for overload, additional steam is admitted at the sixth stage.

USES OF THE STEAM TURBINE. *Land.* Considered as a prime mover the steam turbine has the advantage over any reciprocating engine in that the motion of the moving parts is rotatory and the driving force is applied uniformly round the shaft. It is therefore possible with accurate design and good workmanship to ensure such perfect balance that the motion is barely perceptible. The torque exerted on the driven machine is thus uniform, and if the load on the turbine is constant over a period of time, the speed is constant. The steam turbine is therefore without rival as a prime mover for electric generators (*see* POWER STATIONS), centrifugal pumps, blowers in iron and steel works, and certain textile machines. The high speed makes it possible to develop large powers in engines of small size requiring little space and comparatively light foundations. All large thermal power stations are now equipped with turbo-generators of sizes up to 105,000 kW. As the only parts needing lubrication are the shaft bearings, there is not only considerable economy in lubricating oil, but the exhaust steam is uncontaminated by oil and needs no filtering before being passed to the condenser. Moreover, in factories where steam is used for heating or for various processes, the clean exhaust is immediately available. This is the case in laundries, paper mills, sugar refineries, cotton mills, and others. The steam turbine is thermodynamically efficient in large sizes, above 5000 h.p. Between 10,000 and 100,000 h.p. its efficiency is unsurpassed by any other heat engine. Careful tests on various turbines show a thermal efficiency of 30-35 per cent and in some cases slightly higher, especially at high pressures with reheat.

Marine, see STEAMSHIPS.

See W. J. Goudie, *Steam Turbines*, 1917; *Proceedings of the Institute of Mechanical Engineers*, 135, 1, 1937; A. Stodola, *Steam and Gas Turbines*, 1938; W. J. Kearton, *Steam Turbine Theory and Practice*, 1944; R. H. Parsons, *The Steam Turbine*, 1946.

Turenne, *see* TRANI.

Turenne, Henri de la Tour d'Auvergne, Vicomte de (1611-75), Fr. soldier, b.

Sedan, a grandson of William the Silent. He was brought up as a Protestant. When he was 19 he entered the Fr. Army, and subsequently fought throughout the remainder of Thirty Years War. During the last 8 years of the war he was the leading Fr. commander, though superseded from time to time by his prin. rival, Condé.

During the Fronde disturbances, T. eventually sided with the court, and was the decisive factor in ensuring the final victory of the monarchy over its internal and external enemies. He inflicted crushing defeats on Condé and the Spanish, and was made marshal-general in 1661 by Louis XIV. In the war against the Dutch, 1672, he campaigned with all his usual brilliance, though his devastation of the Palatinate (1674) is a blot on an otherwise outstanding character, whose personal and military conduct was generally superior to that of his prin. contemporaries and rivals. He was killed at Sarbach, fighting Montecuccoli. T. became a Catholic in 1668, probably from motives of genuine conviction. His *Memoirs* were ed. by P. Marichal, 1909. *See also* life by M. Weygand (Eng. trans.), 1930.

Turf Agent, see COMMISSION.

Turf Laws, see HORSE RACING.

Turgenev, Ivan Sergeyevich (1818-83), Russian novelist. His chief works are *Sportsman's Sketches* (1847-52), a series of stories about Russian peasants which made a deep impression on the educated classes of Russia by the vigour of its attacks upon the vices of serfdom (its impact has been compared with that of *Uncle Tom's Cabin*); and the novels *Rudin*, 1856, *A House of Gentlefolk*, 1859, *On the Eve*, 1860, *Fathers and Children*, 1862, *Smoke*, 1867, and *Virgin Soil*, 1877, depicting the intellectual searchings and the psychology of Russian society in the 1830s-1870s from a liberal standpoint. After 1855 T. lived mostly in Germany and France. In Paris, where he lived after 1870, he became exceedingly popular, and it was through the medium of Fr. trans. that his works first became world-famous. T. was indeed the first Russian author to acquire an international reputation. For his influence on the development of the novel in Europe generally *see* NOVEL. *See* his *Works*, trans. by Constance Garnett (14 vols.), 1894-9; and studies by A. Yarmolinsky, 1926; E. Garnett, 1927; D. Magarshack, 1954.

Turgot, Anne Robert Jacques, Baron de l'Aulne (1727-81), Fr. statesman and economist, b. Paris. After holding various minor appointments he was, in 1761, appointed intendant of Limoges, a prov. whose prosperity was then non-existent. His reforms resulted in dramatic improvements there. On the death of Louis XV he was rapidly raised to the position of comptroller-general. By a series of enactments, some of which were repealed immediately after his removal from office, he aimed at making taxation more equitable, destroying the servitude of the peasant class, and removing the

disabilities under which the townsfolk suffered. But all the classes that had benefited from their previous exemption from taxation combined against him, and Louis XVI was too weak to resist. In 1776 he was dismissed.

He pub. sev. works on economics and literature, including *Lettres sur la liberté du commerce des grains*, 1770, and *Réflexions sur la formation et la distribution des richesses*, written in 1766 and pub. in *Ephémérides du citoyen*, 1769-70. His complete works were pub. by Dupont de Nemours, 1809-11. See lives by G. Shelle, 1909, and C. J. Gignoux, 1946.

Turi Language, belongs to the Sudanic linguistic family; see NEGRO-AFRICAN LANGUAGES.

Turisa, see GUADALAVIAR.

Turiaso, see TARAZONA.

Turin (It. Torino): 1. Prov. of Italy, in W. Piedmont (q.v.). It is generally high lying, and has lofty ridges of the Alps (q.v.) in the W., where it is bounded by France. It is watered by the Po (q.v.) and its tribs. the Dora Riparia and the Dora Baltea. The prin. ts include T., Pinerolo, Ivrea, and Chivasso (qq.v.). Area 2690 sq. m.; pop. 1,510,000.

2. (Aenct Augusta Taurinorum), It. city, cap. of Piedmont and also cap. of the prov. of T. It stands at the foot of the Alps, at the junction of the Po and the Dora Riparia, in a position commanding road and rail routes between France and Italy. It was a duchy of the Longobards (q.v.), and eventually became an important possession of the House of Savoy (q.v.). In Fr. hands from 1506 to 1562, and again in 1640, 1706, and 1798, it was annexed to France after the battle of Marengo (q.v.) in 1800. It was the cap. of the kingdom of Sardinia (q.v.) from 1814 to 1860, and of united Italy from 1861 to 1865. During the Second World War the tn suffered severely in air raids in Nov.-Dec. 1942 and July 1943. T. is regularly laid out, and has an aenct castle, sev. fine 18th-cent. palaces, and a 15th-cent. archiepiscopal cathedral standing on the site of a 4th-cent. basilica. There are Rom. remains and notable museums, picture galleries, and academies. Its univ. (1404) ranks next in Italy to those at Naples and Rome. The tn is a great industrial and commercial centre: it has engineering (particularly motor-car), textile, paper, chemical, foodstuff, wine (Vermouth), and publishing industries. Pop. 720,000.

Turina, Joaquín (1882-1949), Sp. composer, b. at Seville, son of a painter of lt. descent. He early studied religious and popular music. A gifted pianist, he became a pupil of Vincent d'Indy at the Schola Cantorum in Paris in 1905. Most of his work consists of piano music and songs; his other works include: *Procesión del Rocío*, a brilliant orchestral study; the operas *Margot* and *Jardín del Oriente*; a string Quartet and piano Quintet, etc. His *Enciclopedia Abreviada de la Música*, pub. in Madrid in 1917, expounds his aims in teaching music.

Turkana, a Nilo-Hamitic people of the deserts of N. Kenya. They are fierce and

nomadic cattle-keepers, without centralised gov., and are closely related to the Jie and Karamojong. See P. H. Gulliver, *The Family Herds*, 1955.

Turkestan: 1. Tn in the S. Kazakhstan oblast (prov.) of Soviet Union rep. of Kazakhstan. It contains a large cotton-ginning estab. Pop. includes many Uzbeks, for whom it has strong historical associations.

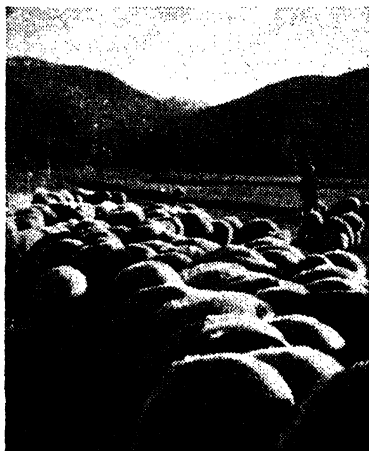
2. An obsolescent name for a vast area embracing: (a) Russian Turkestan, occupying the ter. now divided up between the Turkmen, Uzbek, Kirgiz, and Tadzhik Socialist Soviet Reps.; (b) Chinese Turkestan or the Chinese prov. of Sinkiang; and (c) Afghan Turkestan or the NE. provs. of Afghanistan. See CENTRAL ASIA; SINKIANG; AFGHANISTAN.

Turkey. The rep. of T. comprises parts of E. Thrace in Europe, including Istanbul (Constantinople) and Edirne (some 9000 sq. m. in all), and in Asia the whole of Asia Minor from the Aegean Sea to the frontiers on the W. of the U.S.S.R. and Persia and from the Black Sea in the N. to the frontiers of Syria and Iraq in the S.

Geography. The total area of Turkey, with T. in Europe, is 299,891 sq. m., including swamps, marshes, and lakes. Asiatic T. is practically restricted to Anatolia, the great plateau of Asia Minor (q.v.), and the dists. of Kars, Ardahan, and Batum (excluding Batum port). The chief rvs. are the Kizil Irmak (Halye), Euphrates (Firat), Sakarya, Murat, and Tigris (Dicle). The Bosphorus, which guards the approach to the Black Sea from the Sea of Marmora, and is at the same time the focus of all maritime trade between the Mediterranean and Russia, etc., as well as of the overland routes from Europe into Asia Minor, has fitly been likened to a tortuous riv. valley over whose wooded banks are scattered forts and towers, cities and vils., castles and parks. The S. gate of the sea of Marmora is the Dardanelles, which gives an opening into the Aegean.

Agriculture. The production of tobacco (117,795 metric tons in 1955) is the chief item in Turkish agriculture. Cotton is also cultivated: 60,645 metric tons were exported in 1954. Other products are cereals, figs, silk, olives and olive-oil, dried fruits, liquorice, almonds, nuts, mohair, skins, hides, furs, wool, gums, canary seed, linseed, and serums. The chief tobacco dist. is Samsun, other dists. being Bafra and Izmir (Smyrna). Bursa is the prin. centre for silk production. Olive-oil is chiefly confined to the Vilayet (il) of Aydin. The wheat yield in 1954 was over 4,900,000 metric tons, and that of barley 2,400,000 tons; agriculture is still primitive where railways are lacking, but the peasant is adapting himself to the more modern methods, especially in the Aydin, Adana, and Mersin Vilayets. In 1945 a Land Reform Act gave the landless peasants large tracts of land for subsistence. Live-stock (1953) included 27,287,000 sheep (wool output 36,144 metric tons), 16,094,000 goats and 4,869,000 Angora goats (mohair 7535 tons); cattle 10,759,000.

Minerals are still undeveloped, yet there is every reason to believe that iron, lead, and other metals exist in plenty. T. is one of the main chrome exporters of the world, and there are also exports of copper ore, manganese, zinc, and borax, while the total production of coal is some 5,700,000 tons. There are silver and gold mines.



Turkish Embassy

ANATOLIA: SHEEP ON A FARM NEAR ANKARA

Industry. Since the estab. of the Turkish Rep., in 1923, Turkish industry has made rapid advances. Under the first Five Year Plan (1934), industrial machinery was imported, first from the U.S.S.R., later chiefly from W. Europe. Iron and steel, textile, mining, paper, glass, sugar, and cement works were estab. as staple industries. In 1936 a second Five Year Plan was prepared, dealing primarily with the mining industries and increase of electrification. Total electricity produced in 1954 was 1,387 million kW. A beginning has also been made to utilise the vast resources of hydro-electric power, estimated at 2,200,000 kW. About 12 per cent of the pop. is now employed in industry. In 1939 the first blast furnace was lit at Karabuk, and the output in 1953 included 113,377 metric tons of fluid metal, 99,146 tons of pig iron, 162,641 tons of ingots and steel for casting, and 136,158 tons of rolled-steel products. Hand-loom cotton weaving is still important, there are silk factories in Istanbul, and some traffic in shawls, leather, and the world-famous carpets.

The chief exports are tobacco, cocoons, mohair, figs, raw silk, barley, and opium; whilst the imports are rice, linen, petroleum, woollen stuffs, cashmere, and machinery. In 1955 Turkish exports to

the U.K. were valued at £265.1m., being mainly figs, raisins, mohair, wool, tobacco, and nuts. Turkish imports from the U.K. in 1955 were valued at £2109.3m., these imports consisted chiefly of aeroplanes, iron and steel, and finished cotton, linen, and woollen goods. In 1955 T. exported £2136.2m. worth of goods to the U.S.A. (of which tobacco-leaf constituted the largest single commodity) and imported goods worth £2311.6m. T. has resumed trading with Germany, and in 1955 exported goods valued at £2137.6m, and imported £2224.7m. The merchant marine (1955) had a gross tonnage of 702,000.

Internal Communications. At the end of 1953 T. possessed 15,710 m. of roads. Under a programme drawn up jointly by the Turkish Gov. and the Amer. Aid Mission in T. roads and highways of a total length of 14,316 m. were to be rebuilt or radically repaired by the most modern methods in 3 3-yearly periods beginning in 1949. T. had 4820 m. of railways at the end of 1955, 2203 m. of this having been built since 1923. All railways are State-owned. The prin. tns and cities in T. are linked by the State Airways Administration. T. is connected to all the prin. caps. in the world by air. There is a large modern air-port at Istanbul.

Defence. Military service is compulsory for all men over the age of 20, and liability for service lasts for 26 years thereafter. Service is for 2 years, which may, in emergency, be increased to 3 years. The ann. contingent of men liable to service is about 175,000. The strength of the active army in 1938 was 20,000 officers and 175,000 men, but during the Second World War the strength rose to 11 army corps of 23 divs., an armoured brigade, fortress commands, and cavalry. More than 2,000,000 men can be mobilised. During the Second World War T. received equipment from the Allies, and since the end of the war the military forces have been extensively re-equipped with modern arms. The land forces contain 22 infantry, 6 armoured, and 3 cavalry units. The Navy includes the battle cruiser *Faaz* (the old *Ger. Goeben*); (see GOEBEN AND BRESLAU), launched in 1911 (23,000 tons); 8 minelayers, 23 minesweepers, 10 destroyers, 12 submarines, and 100 miscellaneous vessels. The air force has been increased by Brit. and Amer. aid, and now possesses more than 1000 aircraft. 70 per cent of the machines are of Amer. manuf. The air defence system is being equipped with types of modern radar gear.

Population. A general census (the first in Turkish hist.) was taken in 1927, and the total pop. was found to be 13,648,270. The census of 1955 showed a pop. of 24,111,778. T. is divided into 63 lls. The cap. is Ankara, pop. 453,151 (1955), but the largest city is Istanbul, pop. 1,214,610. Other important tns are Izmir (Smyrna); Adana; Bursa; Eskisehir; Gaziantep; Konya; Kayseri; Erzurum; Diyarbakir; Sivas; Samsun; Izmir; Maras; Zonguldak.

Constitution and Government. On 29 Oct. 1923 T. was proclaimed a rep. and the constitution was promulgated on 20 April 1924. By the Constitution of 20 Jan. 1921 it was declared that all sovereignty belonged to the people, all power, executive and legislative, passed to the Grand National Assembly, a single chamber, as being the sole representative of the people. The members were originally elected for 2 years, and later by the Constitution for 4 years. Army officers may not sit in the Assembly. In 1934 women were given the right to vote and to be elected as deputies. In June 1946 the Assembly altered the Constitution so as to permit all Turkish men and women to vote in legislative elections at the age of 22, and to become deputies at the age of 30. The Electoral Law of 1946 substituted first degree for second degree elections, and provided for secret ballot, and public counting; this law was further revised in 1948 and took its final form in 1950 with the introduction of supervision of the secret ballot, and public counting by judicial election councils. The President, who may not vote, is chosen from among the deputies constituting the Assembly, and his term of office is identical with the life of the Assembly. The Assembly delegates its executive powers to the President and 'to a cabinet chosen by his appointee, the President of the Cabinet.' By the Constitution, local gov. was centralised, the largest administrative area being the il, and under the municipal law of 1930 both men and women have the right to vote and to be elected at municipal elections. In 1937 the Assembly agreed to the estab. of the principles of the Republican People's party, viz. nationalism, democracy, evolutionism, laicism, 'étatisme' (State ownership or control of industries and communications) as part of the Constitution. This meant, in practice, a recognition of only one party in the State and estab. State Socialism. The formation of other parties was, however, authorised before the 1946 elections, the prin. being the Democratic party. Party gov. has begun to evolve, its peaceful estab. being, to a large extent, the work of President İnönü.

İnönü's republican party gov. ruled without effective opposition from 1923 until May 1950, when the electorate returned a gov. of the Democratic party under Celal Bayar, who was elected President in the same year. Bayar's party differs from the Republicans, not so much on account of its greater liberality, but in that it represents *laissez faire* capitalism as opposed to a régime which had retained traces of authoritarianism.

Justice. The old religious courts and the former Courts of Appeal were abolished in 1924, and much of the Ottoman civil code discarded. In 1926 a new penal code was estab., adapted from the It. Code, and new civil and commercial codes, borrowed from Switzerland and Germany respectively. Judges are independent in trying and deciding all cases, and their

judgment is final in all cases. For the training of jurists there are faculties of law at Ankara and Istanbul.

Education. On 3 Mar. 1924 the Muslim religious schools were abolished and replaced by State schools in which, or in community schools or private schools, primary education is compulsory. There are over 17,680 primary schools and over 470 secondary schools. There are univs. at Ankara and Istanbul (founded 1900), and a technical univ. at Istanbul: there are (1953) over 30,000 univ. students, men and women. Religious instruction, hitherto prohibited under the Rep., was made optional in May 1948. In 1948 there was estab. a Brit. Institute of Archaeology at Ankara. By a law of 1 Nov. 1928 everyone between the ages of 16 and 40 was obliged to attend school to learn in place of the Arabic script, a Lat. alphabet incorporating various modifications of all the vowels except *e*, and omitting *q*, *v*, and *x*. There is a state broadcasting system, operating on 3 wavelengths.

History. It was by military conquests that the Ottomans secured a European foothold, and it was thus that the empire reached such splendid dimensions in the 16th cent. In the 7th cent. the Turks first emerge from other tribes of the Turanian stock, and their story opens with the significant fact of their conversion to the Mohammedan faith. Little of consequence is told about them after this until Togrul Beg, the leader of a branch of Tatar invaders, always known as the Seljuk Turks, captured Bagdad in 1058. This led directly to the foundation of imperial power by the Turks in Asia, a power which subsisted almost unimpaired up to the First World War. Cairo and Jerusalem fell before the successors of Ertogrul Beg, and soon the Turks were in possession of Asia Minor and the greater part of Syria. But the Seljuks could not maintain the integrity of their empire against the assaults of the Crusaders, and their place was taken by the stronger and nearly related tribe of Ottomans. The latter overran all the Asiatic provs. that had once been within the confines of the Rom. empire, and made some headway in Europe. Adrianople submitted to their sultan, Murad I (1360-89), in 1361, and soon the city of Constantinople and a few outlying and scattered dependencies were all that were left of the once mighty empire of Constantine.

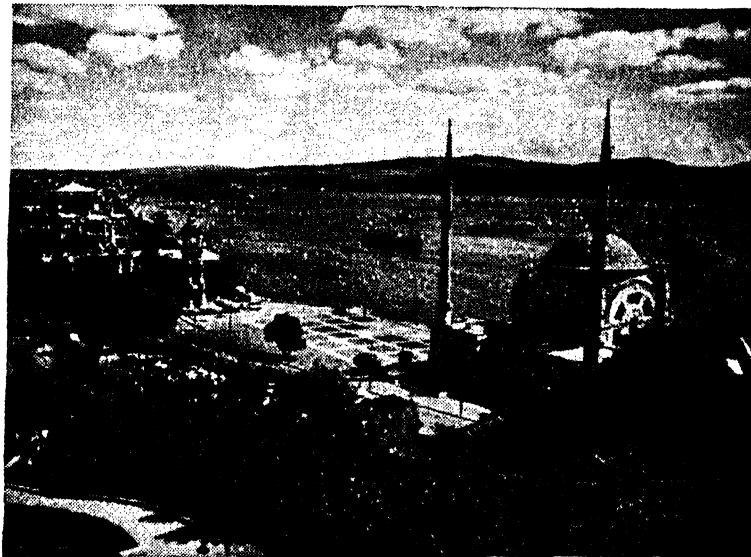
When Murad died he was succeeded by his son, Bayazid I (1389-1403), who also proved a great conqueror. In 1396 he gained a great victory at Nicopolis (in Bulgaria) over the allied armies of Germany, Hungary, and France. The victory alarmed W. Europe, and Constantinople seemed doomed. Indeed, Bajazet had actually begun the siege of that city when the victories of Tamerlane (Timur) forced him to cross the straits in haste to save his Asiatic dominions from this new aggressor. The issue was decided on the field of Ankara (1402), where Bayazid suffered defeat. But the advent of Tamerlane only deferred and

could not stave off the downfall of Byzantium. In 1421 the Ottomans made an unsuccessful assault, and finally Mehmet II stormed the city in 1453.

Greece was annexed by the Ottomans between 1456 and 1460. Serbia had been subjugated in 1389 after the battle of Kosovo, Bulgaria in 1396, and Macedonia in 1430. Thus the Ottomans absorbed the E. empire, but it had not yet reached their farthest limits. Mehmet II succeeded in penetrating into Italy, and for 1 year (1480) the city of Otranto (in Calabria) was under Ottoman

death of Suleyman in 1566 there were only 2 fresh acquisitions of importance, namely Cyprus, which was wrested from Venice in 1571, and Crete, which finally passed into Turkish hands in 1669.

From the last quarter of the 16th cent. dates the gradual but steady decline of the sultan's supremacy. Already, however, the commonwealth of Venice on the Adriatic and northward the kingdoms of Hungary and Poland had proved strong buffers between Christendom in the W. and the lands of Islam in the E. As early as 1456 John Huniades of Poland had



Turkish Embassy

THE BOPHORUS AND DOLMABAHÇE MOSQUE

sway. Selim the Inflexible (1512-20) overran the is. of the Archipelago, took possession of the whole of Syria (1515), obliged the Abbasside Caliph of Cairo to surrender his jurisdiction, and finally annexed Egypt after defeating the Mamelukes (1516). Probably the empire attained its period of greatest splendour during the reign of Suleyman the Magnificent (1520-66). This warrior-king captured Belgrade in 1521, and in the following year expelled the Knights of St John from Rhodes. In 1526 he inflicted an overwhelming defeat on the Hungarians, and in 1529, after humiliating Vienna by a protracted blockade, he marched with a huge army against Germany, but retired on the advance of the Imperial Army. Charles's brilliant seizure of Tunis (1535) was a serious check to Ottoman influence in the S. After the

repulsed the Turks from Belgrade, but the first serious disaster which overtook them was the annihilation of their fleet in the Gulf of Lepanto (1571) by the combined squadrons of Philip II of Spain and the Venetians. This victory ended Ottoman encroachments in the Mediterranean. Most of the Turkish wars continued to be waged with Hungary and Venice, and in 1683 the Turks were once more at the gates of Vienna. This time the cap. was rescued by the opportune arrival of John Sobieski, King of Poland, and the Duke of Lorraine. The peace of Carlowitz, which concluded this war (1699) confirmed the Venetian conquest of the Peloponnese, securing Hungary for the Austrians. Herzegovina was ceded by Leopold to T. A second struggle between the House of Hapsburg and the Porte was terminated by the peace of Passarowitz (1718), when

the former received Belgrade and part of Bosnia and Wallachia. T. had won back the Peloponnesus in 1716, and Belgrade was recovered in 1739.

By this time Russia was pressing hard upon the NE frontiers of the empire, and the long series of the Russo-Turkish wars began in 1730. By the peace of Kuchuk-Kainardji (1774) the sultan relinquished his suzerainty over the Tatar Khans of the Crimea, and Russia secured the approach to the Black Sea. The treaty of Jassy (1792), which closed a second war, was equally favourable to Catherine, for the N. boundary of the Ottoman empire was pushed back to the Dniester. In 1807, the year of the treaty of Bucharest, this boundary was put still farther S., as far as the Pruth. Twenty-one years later Nicholas I of Russia declared a fourth war, concluded by the peace of Adrianople (1830), the chief provision of which was the recognition by the Porte of the complete independence of Greece. Nicholas had timed his invasion so as to profit from the sultan's embarrassment consequent on the Grecian insurrection.

The Crimean war of 1853-6 grew out of Tsar Nicholas's ambition to parcel out the Turkish empire, and so secure the major share, the Balkan peninsula, himself. England and France, however, supported T. At the Peace of Paris (1856) the integrity of the sultan's empire was maintained, and the Christian subjects were put under the aegis of the Great Powers instead of that of Russia.

The whole 19th cent. was marked by a series of revolts. In 1798 Napoleon had easily overcome the Mamelukes of Egypt, who were nominal vassals of T., but it was not till 1879, the year of the estab. of the dual control of France and England, that Turkish overlordship in Egypt finally came to an end. During the Gk war of liberation, and afterwards, great barbarities were inflicted by the Turks on sev. groups of Christians, culminating in the atrocities perpetrated against the Armenians in 1895 and repeated in later years. In connection with this familiar chapter of Turkish hist., it is to be borne in mind that in 1877-8 Russian policy was to encourage the formation of a separate Armenian state under Russian supremacy. Russian intrigues to that end were directed from those Armenian dists. which had previously passed to Russian possession and which included Echmiadzin, seat of the Armenian catholikos. These intrigues combined with revolutionary nationalist conspiracies among Armenian exiles to exacerbate Turkish feeling which, it is alleged in Turkish circles, was still further outraged by Armenian treachery towards the families of Turkish plims.

In 1877 Russia once more adopted the leadership of a Pan-Slavonic movement, and came forward as the defender of the Christians. Once more foreign interference alone stayed the Russian advance on the cap., and the short campaign was brought to an end by the famous Berlin treaty (1878), which was drawn up by the Great Powers acting in concert. By this

agreement the independence of Bulgaria, Serbia, Rumania, and Montenegro was formally acknowledged. Bosnia and Herzegovina were occupied by Austria, and Cyprus handed over to Brit. control. E. Rumelia, whilst being retained by the sultan, was given an 'administrative autonomy' under a Christian pasha. Serbia, it should be noted, had been more or less free since 1807, and the Montenegrians had been virtually free from the Ottoman yoke since 1696. Moldavia, with Jassy, and Wallachia, with Bucharest as its cap., had coalesced into the single kingdom of Rumania in 1861. Cyprus demanded union with Greece as early as 1895; and in 1908 Crete, which was evacuated by Turkish troops in 1898, declared its affiliation with the same state.

The next stage was the movement of the Turks towards reform and the adoption of W. gov. and practice (*see* ATATÜRK). As long ago as 1839 a body of progressive measures, entitled the 'Hatt-i-Sherif', was promulgated, and Christians were at last admitted to office in 1849. Riots in the cap. extorted from the sultan another and enlightened political constitution in 1876, and Midhat Pasha (*d.* 1884) devoted a strenuous life to the furtherance of liberal ideas and progress. But the new constitution remained in abeyance until the Liberal party rose and demanded its restoration. The growing abuses of the gov. resulted in the formation of what is known as the 'Young Turk' party, which included in its ranks some of the most influential men in T. The movement was partly suppressed in 1901. Seven years later the 'Young Turks' again agitated with more effect, as the sultan opened a new Parliament, with Ahmed Riza, one of the leaders of the movement, as president. In 1909 the sultan was deposed, and his brother was called to the throne as Mehmet V. There had previously been trouble with France over the hinterland of Tripoli and with Bulgaria in regard to the 'liberation' of Macedonia. In 1908 Bosnia and Herzegovina were annexed by Austria, and in 1909 Bulgaria's claim to independence was accepted. In 1911 Italy forcibly seized Tripoli, and after a year's desultory fighting T. was obliged to sue for peace, as fresh trouble was brewing nearer home (*see* BALKAN WARS). The first Turkish Parliament was dissolved in 1912, and a fresh cabinet was formed the same year. The treaty of London, signed on 30 May 1913, left T. with only a small strip of ter. in Europe, extending from Midia on the Black Sea to a point near Central Ibrige on the Aegean. T., however, took advantage of the Second Balkan War to take back Adrianople (July 1913).

In 1914 Enver Bey, later Enver Pasha (*q.v.*), became minister of war, and he was under the influence of Germany, represented in T. by a military commission under Gen. Liman von Sanders, who was appointed commander-in-chief of the Turkish Army. On 8 Sept. T. declared the capitulations to be abolished, and following Turkish naval attacks in the

Black Sea, Russia and then England and France declared war on T. Enver Pasha became a virtual dictator, but at the outset Turkish troops met with disaster in the Caucasus (q.v.). In the Allied attempts, however, to force the Dardanelles and take Constantinople the Turks held their own and saved the cap. (see DARDANELLES). The Turks were also fighting on the Mesopotamian front and were at first successful against the Brit. Army beleaguered in Kut al Amara (q.v.). Ger. influence was able to bring about an entente between T. and Bulgaria, but on 21 Aug. 1915 Italy declared war on T. In 1916 the situation did not materially change, although T. was embarrassed by a revolt of the Arabs, who, led by Hussein (see HUSSEIN IBN 'ALI), declared the Sherifate of Mecca independent. In 1917 Sir Stanley Maude conducted brilliant operations on the Tigris, Bagdad being taken on 11 Mar. In Feb. a change of cabinet brought in Talaat Bey as Grand Vizier, Enver Pasha remaining war minister. When the U.S.A. entered the War, relations with T. were severed, but there was no declaration of war. With the defeat of Bulgaria and in spite of T.'s advantageous peace with Russia at Brest-Litovsk (q.v.) in 1918 T. had no hope of victory. On 3 July 1918 Mehmet V d. and was succeeded by his brother, Prince Vahided-Din, who became Mehmet VI. In Oct. Enver resigned and Talaat was succeeded as Grand Vizier by Izzet Pasha. An armistice with the Allies was signed with T. on 30 Oct. 1918 at Mudros.

The 'Young Turk' party (the Committee of Union and Progress, as it was called) had abandoned Constantinople, where in 1919 a feeble Liberal Kintente Gov. was in power with Damad Ferid Pasha as Grand Vizier. A movement, however, towards the regeneration of T. began in Anatolia, where Mustapha Kemal (see ATATÜRK) and his right-hand man, Rauf Bey, a former naval commander, convoked a Turkish Nationalist Congress at Erzerum on 23 July 1919. 'The Anatolian and Rumelian League for the Defence of National Rights,' or simply the 'National Organisation,' resulted. On 4 Sept. 1919 a second congress was called at Sivas, and a party programme was drawn up. The Nationalist party under Kemal, being regarded as rebels, chose Ankara, an impregnable tn, as its HQ, while a Nationalistic army was also formed out of local militias, with Kara Bekir Kâzım Pasha and Ali Fuad Pasha as commanders-in-chief of E. and W. Anatolia respectively. On 5 Oct. 1919 Damad Ferid fell from power in Constantinople. A new gov. was formed under Ali Rıza Bey, and at the ensuing election the Nationalist party found itself legitimised by its strong representation. Moreover, in Jan. 1920 the Turkish National Assembly accepted the 'National Pact,' a declaration of Turkish independence, promulgated from Ankara. Two months later, however, the Parliament was dispersed by Allied forces under Gen. Milne, martial law was proclaimed, and

Damad Ferid Pasha reinstated. The old Parliament, now outlawed, reassembled at Ankara, strongly 'Nationalist' in sympathy. On 20 Jan. 1921 the Law of Fundamental Organisation was drawn up at Ankara, placing the sovereign power in the hands of the Turkish people.



E.N.A.

MUSTAPHA KEMAL (ATATÜRK)

Meanwhile the Nationalist party was further strengthened by Turkish protests against the Gk occupation of parts of Anatolia. The situation rapidly developed into war, of which the first phase in 1920 was favourable to the Greeks, but in 1921 and 1922 the Gk offensives were terminated by Turkish victories, of which the last was complete (see GRÆCO-TURKISH WAR). Gk aspirations in Asia Minor were ended, and all Thrace as far as the Maritza It. was restored to T.

A treaty of peace was signed at Lausanne on 24 July 1923 and ratified by Great Britain 15 April 1924 (see LAUSANNE, TREATY OF). The treaty settled T.'s international relations for some time following, territorial differences with Soviet Russia and the estab. of an overland route between Moscow and Ankara (made possible by the creation of the Soviet Reps. of Armenia, Erivan, and Georgia) having been previously arranged by a treaty of 16 Mar. 1921. By this treaty the dists. of Kars, Ardahan, and Batum (excepting Batum port itself) were assigned to T., and in the ensuing diplomatic struggles with Great Britain and

the actual war with Greece T. could count on the tacit support of Russia.

In July 1922 Rauf Bey, who with Kemal had been mainly instrumental in causing the Nationalist Revolution, became Prime Minister. On 1 Nov. 1922 the sultanate was declared to be abolished. The National Assembly then elected the cousin of the deposed sultan, Abdul Mejid Efendi, to be plain caliph, the Commander of the Faithful, but with no temporal powers. This 'spiritual' caliphate (*see* CALIPH.) was finally abolished in 1924.

Meanwhile, on 2 Oct. 1923, the foreign occupation of Constantinople (now Istanbul) terminated, and on 29 Oct. T. was declared a rep. Mustapha Kemal, the Ghazi, or the Conqueror, was elected as president. The rep. took the form of a powerful oligarchy led by a dictator and depending on a censorship of the Press. The Kurdish rebellion in 1925 aggravated the Mosul Question, which arose out of the conference to determine the boundary between T. and Iraq. Eventually, on 6 June 1926, almost the whole vilayet of Mosul (q.v.) was given by treaty to Iraq. In Mar. 1927 T. signed a commercial treaty with Russia, but later this was offset by frontier trouble with another neighbour, Persia. The general election of Oct. returned the Kemalists to power, and Mustapha Kemal was re-elected president by the new Assembly, which met in Nov. The Persian trouble was settled by a pact, 15 June 1928, and a Turco-Ir. Pact was ratified in Nov. On 10 April 1928 Mohammedanism ceased to be the State religion, although it has remained the religion of almost all Turks. According to the census in 1935 Muslims numbered 15,840,000. There were 125,000 belonging to the Gk church, 11,000 Armenian Christians, and 80,000 Jews. Religious instruction in the schools was forbidden, but in 1948 it was made optional. The work of 'westernising' T. being almost completed, the Ghazi relaxed his methods of dictatorial reform, but the position of the man who had created the New T. always remained unassailable.

Atatürk (Kemal) restricted the new Turkish State to the area actually inhabited by Turks, exchanging, at the same time, the Gk minority from Asia Minor with Turks domiciled in Greece and other Balkan countries. In 1934 the economic Five-Year Plan provided for a number of large State factories, the machinery being imported from Russia and W. Europe. In the new economic system the State reserved the right to plan the general economic course and, while allowing private enterprise, owned the leading industries and supervised and co-ordinated the activities of private concerns (*etatism*). In 1934 T. joined in a regional pact with Greece, Yugoslavia, and Rumania for mutual guarantee of their respective frontiers, and in the same year, by the Pact of Saadabad, T. strengthened her political co-operation with Iraq, Persia, and Afghanistan.

In the field of foreign policy, following the restoration of Turkish sovereignty

over the Dardanelles in 1936 and the retrocession of Alexandretta (q.v.) or Iskanderun in 1938, Turkish relations with the W. democracies became closer: an Anglo-Fr. guarantee against aggression was given to T. in May 1939, and this was followed on 19 Oct. by an Anglo-Fr.-Turkish pact of assistance, effective for 15 years. T.'s position, however, became difficult as the Second World War spread to the Balkans; from the time when Ger. victories in the near E. brought a semicircle of Axis forces round her W. boundaries T. became the victim of great pressure from Berlin, and in June 1941 the Turkish Gov. had little option but to sign a 'Treaty of Friendship' with Germany 'within the limits of the then existing commitments of both countries.' The Turks, however, throughout the negotiations kept the Brit. Gov. informed of progress. It transpired later that Italy urged Germany in 1941 to pass through T. and attack Brit. troops in the Middle E., but that the Germans had preferred to postpone this operation till after the removal of the Russian danger which they hoped to effect in a few weeks. But the situation changed with the great victories at Stalingrad and El Alamein; and Turkish neutrality, which till then was favourable to the Allies, began to be profitable to the Axis. In Feb. 1945, however, by a unanimous vote the Turkish Parliament decided to declare war on Germany and Japan. That step was a consequence of the decision taken by the Allies at Yalta that nations at war with the Axis before 1 Mar. would be qualified to enter into association with the original U.N. In 1945 Russia denounced the treaty of friendship which she had made with T. in 1925, and in the following year made a demand unacceptable to the other parties thereto, for a revision of the 1936 Montreux convention by which T. had gained the right to remilitarise the Straits. This marked the end of a distinct phase in Turco-Russian relations: the post-Revolutionary friendship between the 2 countries, with the economic co-operation that had accompanied it, gave way once more to the traditional grouping of T. in the W. European sphere of influence. America recognised the important position which T. holds as a barrier against the spread of Communism into the Middle E. and Asia, and made substantial loans in order that T. could utilise to the full her economic resources and strengthen her defences.

Until 1945 the Republican People's party tolerated virtually no opposition parties; but after that date genuine opposition parties were allowed to be formed. The leading one was the Democratic party, which gained power in 1950 under its leader Adnan Menderes (b. 1899) who became Prime Minister. In the elections of 1954 it virtually obliterated all the other opposition parties. Since 1950, there have been sporadic complaints which have indicated that the present regime has shown intolerance towards its opponents; but T.'s foreign policy, based on co-operation with W. Europe, has remained unchanged.

In 1951 T. became a member of N.A.T.O. and in 1953 signed a treaty of friendship with Yugoslavia and Greece. Since the end of 1953 Graeco-Turkish relations have suffered a steady deterioration, owing to their different approaches to the Cyprus question, reaching a low point in 1955, when serious anti-Gk rioting broke out in T., causing substantial damage and loss of life. In 1956 T. announced her acceptance in principle of the Radcliffe proposals on Cyprus, which suggested a partition of the is. into Gk and Turkish areas. T.'s treaty in 1954 with Pakistan was really the foundation stone of the subsequent Bagdad Pact (1955); but the practical value of this was largely nullified (at least temporarily) by events in Egypt and other Middle E. Arab states at the end of 1956. T.'s relations with Britain and France, however, remained markedly friendly in spite of radical differences on the Suez question. After the general election in 1957 the Democrats remained in power, but their majority over the People's Party was considerably reduced. Tension built up in 1957 between T. and Syria, Syria accusing T. of aggressive designs on her ters, bordering on T., accusations which T. vehemently denied.

Literature. Like early Lat. poetry, the literature of the Osmons is almost wholly one of imitation, and just as Terence and Plautus sought inspiration from the old Gk writers of comedy, so the primitive Ottoman poets were much influenced by Persian verse. From Persian poets they borrowed their forms, their style, and their theme. Ahmed Pasha (d. 1496), a vizier of Mehmet II, freely plagiarised the popular 'ghazels' of the Persian Nevayi (d. 1500). Fuzuli of Bagdad (d. 1555), one of the first of Ottoman poets, is admired above all for the tender beauty of his *Divân* or collection of ghazels, and it was this vehicle (the ghazel) which the versatile Nâbi (d. 1712) chose when he wished to reproduce the didactic and philosophical strain of the Persian Sâib (d. 1677). The brilliant panegyrics of Nef'i of Erzurum (d. 1634), are expressed in the form of the 'kasida' or lyric of Arabia. Both the ghazel and the kasida were adopted from Persian literature. In style again Ottoman writings reveal the merits and demerits of their Persian prototypes. They are mannered and insincere, and tainted with that artificiality which invariably infects a court literature.

The same thoughts are apparent in the prose hist. of Sa'd-ud-din (d. 1599), entitled the *Crown of Chronicles* (*Tâj-ut-Tevârikh*), where the excess of rhetoric palls and where that favourite embellishment known as the 'sej', which consists in rhyming the last words of successive clauses, produces a jingle which falls unpleasantly on W. ears. Finally, the imitation of Persian models is equally apparent in subject-matter. Ottoman poets, like their masters, never sang the song of battle, though they belonged to a race pre-eminently war-like, but devoted themselves rather to composing love-

lyrics and odes to the joys of nature. In the last cent. a revolution was effected in literature as in the political world. W., and especially Fr., modes of thought filtered into the cap, and modern writers have gone back to a simplicity and naturalness of style more suited to their modern outlook.

Art. Conquest influenced Turkish art between the 11th and 17th cents. The Turks proved extremely susceptible to artistic influence from the countries that they conquered, absorbing and adapting much that they found, so that their buildings became quite different from the simple structures of primitive Muslim culture. During the Seljuk era (c. 1073-1306) art remained fairly plain,



Turkish Embassy

THE SULEYMAN MOSQUE, EDIRNE

although the frequently used geometric decoration became more involved towards the end of the period. Under the Ottomans, with the growing wealth and power of T., all branches of art became increasingly ornate. Examples of this are found in the cupolas and minarets of Edirne. Byzantine influence can be traced in the elaborate, rich detail. After the fall of Constantinople in 1453 Byzantine influence reached its zenith: in converting the church of St Sophia into a mosque, many tricks of Christian craftsmanship appear to have been absorbed, which were incorporated into the style of the Suleyman Mosque in Edirne (1570-4). The mosque remained the centre of Turkish life until after the estab. of the Rep. in 1923. Most artistic developments are therefore found in religious buildings, but domestic architecture of the period

shows the frequent use of elaborate trellis-work and carving. In the 19th and still more in the 20th cent., Turkish art copied W. European and N. Amer. styles. From this, however, a certain individuality of detail is now beginning to evolve. There are also many buildings within the area of modern T. belonging to the civilisations which the Turks conquered: the Byzantine remains at Iznik were largely destroyed during the Gk-Turkish war in 1921, but Istanbul contains a number of Byzantine buildings, chief among which is the former church of St Sophia.

Turkish music has evolved a distinct style of its own, setting it apart from the musical culture of other Arab states. A great contribution was made by the Dervish communities in the 15th cent. They produced a large amount of inspired religious music such as *Hymns* (Ilahi), *Prayers of the Prophet* (Teveih), and *Songs of the Dervishes* (Ayin Sharif). Modern developments are wholly influenced by W. European and N. Amer. styles.

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Turkey (*Meleagris*), name for 2 Amer. species, the largest of the game birds, once believed to have come from Turkey. *M. gallopavo*, the origin of the domesticated varieties, formerly occurred throughout the N. Amer. continent, and was abundant in the U.S.A., in parts of which it is still hunted with greyhounds. The wild birds are both larger and more ornate than domesticated T.s, which, however, have been improved by introductions of wild blood. The largest of the domesticated varieties is the Amer. mammoth bronze, the plumage of which is a beautiful dark bronze with a red metallic lustre. Among other varieties are the white, buff, slate, and black. *M. ocellata*, the other species, occurs in Honduras, and has plumage of great brilliancy with ocellated tail feathers. See also POULTRY.

Turkey-buzzard, see VULTURE.

Turkey Oak, *Quercus cerris*, is common in the SE. countries of Europe. It has deciduous, short-stalked leaves and bristly cups for the acorns.

Turkey-red, see DYE.

Turki Runes, see OGHUKH INSCRIPTIONS.

Turkistan, see TURKESTAN.

Turkmenia, or **Turkmen S.S.R.**, constituent rep. of the U.S.S.R., bordering on Iran, Afghanistan, the Uzbek and Kazakh reps., and the Caspian Sea. It is mountainous in the S. and W. and a plain in the N. As a result of the hot climate, 80 per cent is desert or semi-desert, but irrigation of the Kara-Kum (q.v.) is being effected from the Amu-Darya R. and subterranean supplies. There are oases, nourished by the waters of the mt streams. Cotton (including a special long-fibred variety), wheat, and cattle are the main agric. products. Silk cultivation and carpet-weaving have been revived. Since 1925 chemical and other industries have been estab., and a new oil tn, Nebit-Dag; there are deposits of salt, oil, potassium, gypsum, magnesium, and coal. Research institutes number about 50. The pop. consists of Turkmen (78 per cent) with Russians and Uzbeks, etc., the first being Muslims. The cap. is Ashkhabad; other tns include Mary (Merv), and Krasnovodsk, a seaport and the terminus of the Transcaspian railway. Administratively the rep. is divided into the Ashkhabad, Mary, Tashauz, and Chardzhou oblasti (provs.). Area 189,400 sq. m.; pop. 1,290,000. See also CENTRAL ASIA.

Turkomans, more properly **Turkmen**, a Turkic people mainly inhabiting the Turkmen S.S.R. of the Soviet Union. Many thousands of them live in N. Persia and N. Afghanistan. They first appeared in the present habitat in the 11th cent. during the great Oghuz migration from the regions N. of the Syr Darya R. The Turkmen dynasties of the 15th cent. had considerable power, and they retained some kind of independence until they were subdued by Russia 1881-5. Their

language is classed as W. Turkish and is closely related to the language of Turkey. There is a Turkmen community of some thousands in the Stavropol' Kray in the Caucasus.

Turks, or Turkic Peoples, are terms without any racial significance which can, however, be applied to the peoples linguistically and historically related to the 'Tu-Kiu,' the name given by Chinese chroniclers to a nomad people first mentioned in hist. in the 6th cent. AD. Apart from the T. of the Turkish rep., the T. P. have no common characteristic other than language; but the Turkic languages have a remarkable inter-resemblance, the Uygur spoken in W. China being similar to the Turkish spoken by Muslim communities in Yugoslavia. The total number of so-called Turks is about 40,000,000, of whom about 18,000,000 are in Turkey and 17,000,000 in the U.S.S.R. (the Volga region, Caucasus, and Central Asia). Of the remainder about 3,000,000 are in China and 2,000,000 in Persia and Afghanistan, with some small scattered communities elsewhere in Asia and Europe. Linguistically, the T. may be divided into 2 groups, the W. including the T. P. of Europe and of W. Asia, and the E., including the peoples of Kazakhstan, Turkmenistan, Uzbekistan, and Kirgizia, of the Chinese prov. of Sinkiang, and some scattered elements in E. Siberia. For further information see **TURKEY; CENTRAL ASIA; KAZAKHIS; KIRGIZ; TURKOMANS; UZBEKS; TATARS.**

Turks and Caicos (or Cayos, or The Keys) Islands, group of is. lying to the S. of the Bahamas, W. Indies, administered jointly since 1874 as a dependency of Jamaica. The group consists of 8 inhabited is. and sev. uninhabited rocks numbering about 30 in all. The total area is 166 sq. m. The largest, Grand Caicos, is 25 m. long by 12 broad. The seat of gov. is at Grand Turk, 7 m. long by 2 broad. (Pop. 1800.) The inhabited is. are wooded and fairly fertile, but the climate is enervating. The chief industries are the exportation of salt, sponges, and turtle-shell, the cultivation of sisal hemp (on W. Caicos), and fishing. There is an important cable station on Grand Turk; also a weather bureau, a guided-missile observer station, and an oceanographic measurement station are operated by the U.S. Gov. Turks Is. were discovered about 1512, but no attempt at occupation was made until 1678, when their value for the production of salt was recognised by the colonists of Bermuda. The first royal regulations for the gov. of the salt ponds show that down to 1781 no permanent settlement or idea of fixed property in the ponds was entertained. There existed a 'head right' system by which one-third of the ponds was reserved for gov. expenses while the remainder was shared among the inhab. Every adult was entitled to a full share, children being allotted tenths in proportion to their height. Some of the public officials and ministers of religion received their salaries in bushels of salt, which

recalls the anct *salarium* or salt allowance of the Rom. soldier. Towards the end of the 18th cent. the Bahamas Gov. laid claim to the T. and C. Is., and despite the vigorous protests of the Bermuda salt-rakers, it was determined by order in council in 1804 that the legislation of the Bahamas Gov. should extend to them. At the end of a struggle lasting 50 years, in which it was eventually recognised that conflicting interests and communication difficulties rendered common legislation impossible, a further order in council placed T. and C. Is. as an independent administration under the supervision of the governor of Jamaica. Meanwhile the 'head right' system was replaced by a leasehold system. Calcos Is., which in 1848 were appended to Turks Is. for governmental purposes, were formerly occupied by loyalist refugees from Georgia after the declaration of independence by the U.S.A.; but the white owners, owing to losses and destruction from hurricanes and insect pests, lost heart and departed, abandoning their lands to their slaves. After incorporation the exploitation of the group for salt production was mooted, and in 1850 Cockburn harbour was laid out in salt ponds on more modern lines than those of Grand Turk or Salt Cay. The hurricane of 1866 left both the gov. and the pond owners in a state of financial embarrassment and, after sev. years of hopeless struggle, the export tax on salt was abolished, drastic retrenchment effected, the elective system of legislation abrogated, and the Is. became a Crown colony and a dependency of Jamaica. To-day there is a legislative board for the T. and C. Is. comprising 4 official and 8 elected members with the commissioner as President; its ordinances require the assent of the governor of Jamaica. Pop. (estimated) 6315.

Turksib, short for **Turkestan-Siberia Railway,** important railway in Russia, connecting the Trans-Siberian (q.v.) and the Orenburg-Tashkent line. It runs through Novosibirsk Oblast, Altay Kray, and SE. Kazakhstan (see **KAZAKHSTAN**). It was built 1913-30 and hailed by Communists as the first achievement of the Five Year Plan.

Turku (Abo), important tn in Finland, and formerly cap., situated on the Aura-joki R. not far from its mouth. Its univ., founded in 1640, was removed to the present cap., Helsinki, after the disastrous fire which destroyed its buildings and most of the tn in 1827. It has important shipbuilding, textile, and machine industries, and timber trade. Pop. 74,000.

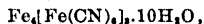
Turku-Pori, co. of Finland, on the Gulfs of Finland and of Bothnia, with numerous lakes. Mining, fishing, cattle-rearing, and engineering are carried on; there are shipyards, and manufs. of paper, leather, tobacco, wood, and metal products, also distilling and brewing industries. The cap. is Turku (q.v.); Rauma and Pori are the prin. tns. Area (land) 8500 sq. m.; pop. 647,100.

Turmeric (*Curcuma longa*), plant with long leaves and a spike of pale cream

flowers, a native of Ceylon, and extensively cultivated in India for its rhizomes, which when dried and ground yield a yellow dye. It is also used as an ingredient in curries, and has various uses in Hindu medicine. T. paper is an unsized paper dipped in an alcoholic solution of T., and is used as a test for alkalis, with which it gives a brown colour turning violet on drying.

Turn, see under ORNAMENTS, MUSICAL.

Turnbull's Blue, blue pigment which is precipitated by the action of potassium ferriocyanide on a ferrous salt. Its composition is identical with that of insoluble Prussian blue, viz. ferric ferrocyanide,



which is formed on the addition of a ferric salt to a ferrocyanide. See DYE.

Turnebus, Adrianus (properly **Adrien Turnebe**) (1512-65), Fr. classical scholar, b. Les Andelys, Normandy. In 1547 he was appointed prof. of Greek and Latin at Paris. He wrote theological and critical treatises and trans. a number of classical authors.

Turner, Sir Ben (1863-1942), trade unionist, b. Holmfirth, Yorks, his parents being hand-loom weavers, worked at a mill as a half-timer. For some time he was a delegate to the Trades Union Congress and a member of its General Council, and in 1927-8 was chairman of the Council, becoming president of the T.U.C. in 1928. For 20 years from 1902, he was unpaid general secretary of his trade union and also dist. secretary of the heavy woollen branch of the workers' organisation. In 1922, following an amalgamation of unions, he became President of the National Association of Textile Workers, being at the same time President of the National Associations of Unions in the Textile Trade. He was elected M.P. for the Batley and Morley Div. in 1922, but lost his seat in 1924; he was re-elected in 1929 and again defeated in 1931. In 1929 he was made secretary for mines, but resigned a year later to resume his trade-union work. T. was knighted in 1931.

Turner, Charles Tennyson (1808-79), poet, b. Somersby, Lincs, brother of Alfred, Lord Tennyson (q.v.). Educ. at Louth Grammar School and Cambridge, he took orders and became vicar of Grasby, Lincs. He collaborated with Alfred in *Poems of Two Brothers*, 1827. In 1830 he changed his name to T. on inheriting the property of a great-uncle. His *Collected Sonnets, Old and New* appeared in 1880. See H. Nicolson, *Tennyson's Two Brothers*, 1947.

Turner, Cyril, see TOURNEUR.

Turner, Frederick Jackson (1861-1932), Amer. historian, b. Portage, Wisconsin. Educ. at the univ. of Wisconsin and Johns Hopkins, he was prof. of history at Harvard from 1910 to 1924. In 1893 he wrote a notable paper which became the chief essay in his book *The Frontier in American History*, 1920, and had a profound effect on Amer. historical thought. Others of his works are *The Rise of the New West*, 1906, *The Significance of*

Sections in American History, 1932, which was awarded the Pulitzer Prize, and *The United States, 1830-1850*, 1935.

Turner, Joseph Mallord William (1775-1851), landscape painter, b. London, son of a barber. His general education was limited, but early experience as a copyist in the house of the art collector Dr Monro (where he became intimate with Girtin) enlarged his view of painting and drawing. In 1789 he entered the Royal Academy schools, and in 1798 exhibited sev. pictures at the Royal Academy. Four years later he was made an academicien. In 1807 he began the pub. of his *Liber Studiorum*, consisting of a series of Eng. landscapes, many of them engraved by the master himself. In 1828 he travelled in France and Italy, and in 1831 he visited Scotland, having been asked to illustrate a new ed. of Sir Walter Scott's poems. The following year he lived at Venice, and in 1836 he went a second time to France; but the closing years of his life were spent mainly in London, and he d. there. He was buried in the crypt of St Paul's Cathedral, and, in accordance with his will, the National Gallery acquired a large array of his oil-paintings and over a thousand of his sketches. In the Glasgow Art Galleries are also a number of his works, and there is a fine collection of his water-colours in the National Gallery of Scotland. T.'s earlier paintings are sober in colouring, blue, greys, and browns predominating; the pictures of his middle and late period are remarkable for their splendour of colouring and brilliance of light effects, as exemplified in 'The Fighting Temeraire' and 'The Sun of Venice Going to Sea.' T. possessed the gift of capturing and rendering transitory effects of light, and also in colour and romantic composition is one of the greatest figures in the hist. of landscape painting. The most important study of his art is that embodied in Ruskin's *Modern Painters*. See also W. G. Rawlinson, *Turner's Liber Studiorum*, 1906, and *The Engraved Work of Turner*, 1908-13; W. Bayes, *Turner: A Speculative Portrait*, 1931; B. Falk, *Turner, the Painter*, 1938. See lives by G. W. Thornbury, 1877; Sir W. Armstrong, 1902; A. J. Finberg, 1939.

Turner, Walter James Redfern (1889-1946), Brit. poet, novelist, and music critic, b. Melbourne, son of an organist. Educ. at Scotch College, Melbourne, he came to London at the age of 17, and later studied at Vienna, Dresden, and Leipzig. During the First World War he served in the Royal Garrison Artillery. He was music critic of the *New Statesman* from 1916 to 1940, and literary critic of the *Spectator* from then till his death. Much of his verse is exotic, with rich and flowing language; vols. include *The Hunter*, 1916, *The Dark Fire*, 1918, *Paris and Helen*, 1921, *Landscape of Cythera*, 1923, *The Seven Days of the Sun*, 1925, *New Poems*, 1928, *Pursuit of Psyche*, 1931, *Songs and Incantations*, 1936, and *Fables, Parables, and Plots*, 1943. Among his novels are *The Man Who Ate the Popomack*, 1922, *The Aesthetes*, 1927, and *The Duchess of*

Popocatapell, 1939. His musical pubs. include *Variations on the Theme of Music*, 1924, and biographies of Beethoven, 1927, Wagner, 1933, and Mozart, 1938.

Turner Valley, dist. of Alberta, Canada, 35 m. SW. of Calgary. There is a vast subterranean oil pool which has been developed since 1936 and now produces 2 per cent of the Canadian output of petroleum. The field was discovered (1912) by C. W. Dingman; a further oil boom took place in 1929. The valley was named after the Turner brothers who took out homestead rights in 1886.

Turnhout, tn in the prov. of Antwerp, Belgium, 25 m. ENE. of that city. It is the economic cap. of the Kempen (Campine) region. T. is famous for its paper industry, and its coloured papers and playing-cards are largely exported. There are also printing-works, iron-foundries, mills, brick-kilns, and manufs. of lace, pottery, chocolate, and gingerbread. Pop. 34,000.

Turnip, or *Brassica rapa*, biennial cruciferous plant grown for its thick, fleshy root both as a garden and a farm crop. T.s are classified according to their shapes, Long, Tankard or Spindle, Round or Globe, and Flat. Another classification is according to the colour of the flesh. White-fleshed varieties are of rapid growth and produce much bulk in a short time, but their feeding value is low, and they are liable to be injured by frost. The yellow-fleshed varieties are of slower growth, but are of superior feeding value and keep better during winter. They are probably hybrids between the T. and the Swede (*Brassica napus*), which is distinguished by its neck or collar.

Turnour, Cyril, see **TOURNEUR**.

Turnovo, see **TYRNOVO**.

Turnpike Roads, see **TOLLS**.

Turnsole, see **HELIOTROPE**.

Turnstone, or *Streptopelia interpres*, shore bird allied to the plovers and so called from its habit of turning over stones and shells on the seashore in the search for marine insects and small crustacea. It is widely distributed, but breeds chiefly on Scandinavian coasts, and only visits Britain in the winter. It is about 9 in. long. The upper parts are chestnut with black spots, and the lower parts white, except on the breast.

Turntable Ladders, see **FIRE BRIGADES AND FIRE FIGHTING**, Fire 'Escapes' (*Ladders*).

Turnu-Severin, city of Rumania, at the exit of the Iron Gates, prov. of Craiova, on the l. b. of the Danube. The present tn, built on Rom. and medieval foundations, was founded 1835-41. It trades in live-stock, cereals, and petroleum, and has shipyards and repair shops. It was captured by the Austrians in 1916, and by the Russians in 1944. Pop. (1948) 31,296.

Turnus, son of Daunus and Venilia, and king of the Rutulians, was inspired by Hera to oppose Aeneas, and was slain by him.

Turpentine, is obtained by distillation from the oleoresinous exudation of pine-trees, and is obtained from America, France, India, Portugal, and Spain.

Chemically, oil of T. is a mixture of various terpenes in somewhat variable proportions and is a colourless liquid of sp. gr. 0.86. It has a boiling range from 150° to 170° C. It is insoluble in water, but is an excellent solvent for phosphorus, sulphur, and iodine. The oil is used in medicine externally as a counter-irritant. It is also a solvent for paints (q.v.) and varnishes (q.v.). In the latter fields, however, its place has steadily been usurped by white spirit, a much cheaper petroleum fraction (often called T. substitute) which can, nevertheless, replace T. in most paints without detriment to the product. T. is also used in the preparation of polishes, leather dressings, and synthetic camphor. See also **ALK.**

Turpentine Tree, see **PISTACIA**.

Turpin, Richard (Dick) (birth variously stated as 1705, 1706, and 1711; hanged 1739), highway robber whose fictitious exploits on his mare 'Black Bess' have secured for him almost legendary fame. T. was the son of an Essex inn-keeper, and began his career by cattle-stealing when apprenticed to a butcher. He was in reality entirely without scruples or mercy, and was ultimately convicted at York of horse-stealing and hanged.

Turquoise, or *Callait* ($\text{Al}_2\text{O}_3 \cdot \text{P}_2\text{O}_5 + 5\text{H}_2\text{O}$), blue or bluish-green mineral which is in great favour as a gem. It is reniform or stalactitic, never crystallised, has a waxy lustre, and is feebly translucent or opaque. (Hardness 6, sp. gr. 2.7.) The blue or green colour is due to copper phosphate. On placing in hydrochloric acid the colour disappears. The best specimens for gems are obtained in Persia, others in India, Tibet, Arabia, Australia, the U.S.A., and Saxony.

Turres, see **PIROT**.

Turriff, burgh of Aberdeenshire, Scotland, 35 m. NW. of Aberdeen. Originally known by the Celtic name of Turbrud, the tn was founded in the 6th cent. It is an agric. mkt. tn and egg-packing centre, and agric. engineering and implement-making are the chief industries. Pop. 3000.

Turtle, aquatic reptile of the tortoise family (*Chelonidae*). T.s differ from land tortoises in having the feet modified into paddles. They resort to the sandy shores to lay their eggs. The green T. (*Chelonia mydas*) is used for turtle soup. The hawksbill turtle (*Chelone imbricata*) yields tortoise shell. See also **CHELONIA**; **TERRAPIN**; **TORTOISE**.

Turtle Dove, or *Streptopelia turtur*, summer visitor to Europe and Britain, which it leaves about Michaelmas to winter in Africa. It is from 12 to 13 in. long, with a long, much-rounded tail. The plumage is greyish brown, with yellow on the sides of the head and pink on the neck and breast. The back of the neck and crown are greyish blue, and the legs and toes are red. Two pure white eggs are laid in a rough structure of twigs placed in a tree near the ground. The male assists the female in incubation, and their devotion is proverbial. Another species is the collared T. (*T. risorius*),

which is often kept in captivity. This latter species is about 10 in. long; has a short tail; general colour grey, tinged with red, upper parts greenish-brown, with black collar on back of neck.



HAWKSBILL TURTLE

Turton, tn and urb. dist. of Lancs, England, 4 m. from Bolton. It is largely rural in character, and consists of 7 wards, with a few cotton-bleaching, finishing, and printing mills in the dist. T. Tower, a 16th-cent. mansion, is now a civic centre and museum. Pop. 11,000.

Turukhansk: 1. Obsolete name of a vast ter. in N. Siberia along the lower Yenisey (Krasnovarsk Kray), annexed to Russia in the early 17th cent. The ter. is rich in mineral resources; from the 19th cent. an area of banishment, it now has forced-labour camps (*see* NORILSK; IGARKA; MANGAZEYA; TAYMYR; EVENKI).

2. (Formerly **Monastyrskoye**), vil. at the confluence of the Yenisey and the lower Tunguska. Pop. (1940) 3000. Before 1917 it was the centre of the T. banishment area.

3. (1672-1782 **Novaya Mangazeya**, now **Stary T.**), vil., former tn, near (2), founded in 1607, from 1672 a tn, the administrative and fur-collecting centre of T. ter.

Tuscaloosa, city of T. co., Alabama, U.S.A., on the Black Warrior R. It is the seat of the univ. of Alabama, and has cotton manufs., lumber mills, and coal mines in the neighbourhood. Pop. 46,400.

Tuscan League, *see* FLORENCE.

Tuscan Shrew (*Suncus etruscus*), small mammal, measuring from snout to tail less than 3 in. The head and body actually measure only 1½ in. Its fur is ashy red above, and lighter beneath, the tail clothed with short hairs with rings of longer white hairs; ears moderate and projecting from the fur. It is found in the S. of Europe from S. France to the Black Sea and in N. Africa.

Tuscany (It. *Toscana*), region (*compartimento*) of central Italy, comprising

the provs. of Massa e Carrara, Arezzo, Florence, Grosseto, Leghorn, Lucca, Pisa, Pistoia, and Siena (qq.v.). It is bounded N. by Emilia-Romagna, W. by the Ligurian and Tyrrhenian Seas, SE. by Lazio, and E. by Umbria (qq.v.). It is mostly in the N. Apennines (q.v.), is watered by the Arno (q.v.), and contains the Maremma (q.v.). T. is roughly co-extensive with the anc. Etruria (q.v.). Since the rise of the Medici (q.v.) in Florence, the region has been dominated by that city. On the extinction of the Medici in 1737, T. passed to the House of Hapsburg (q.v.). It was invaded during the French Revolution, the grand duke, Ferdinand III (q.v.), being forced to flee. By the Peace of Lunéville (q.v.) in 1801 T. was given to Spain, but in 1807 it was ceded to Napoleon I (q.v.). On Napoleon's downfall in 1814 Ferdinand III returned, and in 1848, under his son, Leopold II, a constitution was granted. However, a revolution broke out, and Leopold maintained his position only with the aid of Austrian troops. In 1859 Leopold was expelled by the Florentines and T. voted for annexation to Sardinia (q.v.), becoming part of united Italy in 1861. The contribution of T. to It. culture has been very great, and the Tuscan dialect has become the literary language of Italy (*see* ITALY, *Language and Literature*). The region has copper, iron, lignite, and manganese deposits, marble is quarried, and cereals, vines, tobacco, and olives are grown. Area 8861 sq. m.; pop. 3,209,000. *See* Zobi, *Storia Civile della Toscana*, 1850; J. A. Ross, *Old Florence and Modern Tuscany*, 1904; A. M. and J. W. Cruikshank, *The Smaller Tuscan Towns*, 1912; E. Hutton, *A Wayfarer in Unknown Tuscany*, 1925; D. Patmore, *Italian Pageant*, 1950.

Tuscaroras, tribe of N. Amer. Indians. Driven out of Carolina by the whites, they became one of the tribes of the Iroquois (q.v.) Confederacy. To-day there are about 800, in Canada and New York State.

Tusculum, anc. tn of Latium, 15 m. SE. of Rome, said to have been founded by Telegonus, son of Odysseus. The modern Frascati is close to the site. When Octavius Mamilius, Tarquin's son-in-law, was driven out of Rome, he took refuge in T., whence he led the Lat. allies of Lars Porsena against the Romans, but perished in the great battle of Lake Regillus (497 bc). From that time till the Lat. war of 340 bc, T. remained faithful to Rome. Cato the Censor, was b. there. Its proximity to the cap. and the beauty of its situation made it a favourite summer resort of the Rom. nobles. Cicero had a villa at T., which he frequently mentions under the name of Tusculanum.

Tuskegee, tn of Alabama, U.S.A., about 50 m. due E. of the cap. Montgomery. It is noted for the T. Institute, a Negro univ. and the next oldest to Hampton (Virginia), which was founded by Booker T. Washington and is notable for the scientific work done in its laboratories by Dr George Washington Carver. Most of the students, who numbered nearly 2000 in

1953, are from the Lower S., and the student body is 99 per cent Negro; there are a few Amerindians; the faculty is exclusively Negro. Pop. 6700.

Tusaud, Madame Marie (1760-1850), foundress of the waxwork exhibition in London. b. Bern, Switzerland. She studied art under her uncle in Paris, and was appointed drawing-mistress to the ill-fated family of Louis XVI. Coming to England in 1802, she settled in London, where her exhibition, first shown at the Lyceum in the Strand, became, and still is, one of the most popular sights of the city. The building was destroyed by fire in 1925 and re-opened in 1928. During the Second World War it was damaged by a bomb in 1940, but is now re-opened. See L. Tusaud, *The Romance of Madame Tusaud's*, 1937, and Sylvia Martin, *I. Madame Tusaud*, 1957.

Tusser, Thomas (c. 1524-1580), poet and writer on agriculture, b. Rivenhall, Essex. Educ. at Eton and Cambridge, he held the post of musician to Lord Paget. He wrote *A Hundreth Goode Pointes of Husbandrie*, 1557, giving instruction in farming in rude but lively verse, and later *A Hundreth Goode Pointes of Husserie or Housewifery*. The two works were afterwards reprinted together. Despite his shrewd advice to others, he died in prison as a debtor.

Tussilago Farfara, see COLTSFOOT.

Tussock Moths (*Dasychira*), genus of moths, 2 species of which occur in Britain, the rare dark T. M. (*D. fascelina*) and the pale T. M. (*D. pudibunda*), a common moth of a greyish colour. Its caterpillar, which has a number of tufts or tussocks of hair, sometimes causes considerable damage to hops and forest trees.

Tutankhamen, Egyptian king of the 18th dynasty, son-in-law and successor of Akhnaton (q.v.). He came to the throne at the age of about 10 as Tutankhaton, being married to Akhnaton's third daughter Ankhesenpaaton, and d. aged about 18, Smenkhkara, who had married the eldest daughter, having d. about the same time as Akhnaton. The religious reformation had left much dissatisfaction in the kingdom, and orthodox proving too strong, T. had to re-adopt the worship of Amen and move the court from Akhetaton back to Thebes, changing his name to Tutankhamen. An unimportant king who d. prematurely, he owes his fame to having been buried in a small tomb which was concealed by the soil from digging the larger tomb of Rameses VI near by; so that his came to be the only royal tomb of Egypt to survive almost intact until 1922, when it was discovered by Howard Carter (q.v.). The sarcophagus, with the golden coffin, is still in the tomb, but the other contents fill most of the upper floor of the Cairo Museum, and are now one of the wonders of the world, although artistically verging on decadence and but a fraction of the magnificence with which the greater pharaohs must have been buried.

The tomb had been entered by thieves and sealed again by the inspectors of

Rameses IX. The antechamber, a small room 26 ft. by 12 ft. was filled with furniture, etc., including 4 chariots, 3 gilt couches, a wonderful throne covered with gold and inlaid, a statue, a casket containing robes, other boxes, stools, vases of stone and faience, etc., and 2 life-size statues of the king flanking the doorway to the painted burial chamber, about the same size, and filled to within 2 ft. of the wall by a shrine containing 3 other shrines. Between the shrines and the walls were various objects, including emblems of Anubis, 11 magic oars, and a silver trumpet. Each shrine was overlaid with gold, and between it and the next were stacked vases, sticks, bows, etc. The second shrine was sealed, showing that the actual burial had never been disturbed. The last shrine exactly fitted the quartzite sarcophagus, with a goddess in high relief at each corner. Within were 3 coffins, all in the form of the king as Osiris, the first two covered with gold and the third of solid gold. Inside was the mummy with a mask of beaten gold; with many amulets and ornaments were 2 daggers, one with blade of iron and the other of gold. In a room off the burial chamber was a shrine of Anubis, and a shrine over the canopic chest containing the royal viscera and guarded by 4 statuettes of goddesses, caskets, over 400 *shabti* figures, a lock of Queen Ti's hair in a miniature coffin, statuettes of divinities, model boats, etc. A fourth room contained much other furniture and provisions. See Howard Carter and A. C. Mace, *The Tomb of Tut-Ankh-Amen*, 1923-33; Penelope Fox, *Tutankhamun's Treasure*, 1951.

Tutbury, tn of Staffordshire, England, on the Dove, 4 m. from Burton-on-Trent and 140 m. from London by rail. T. has a ruined castle, in which Mary Queen of Scots was imprisoned. There is a parish church built in 1083, which is notable for its Norman doorway. The tn has an agric. trade, and old glass-cutting works famed throughout England. Pop. 2274.

Tutela, see TUDELA.

Tuthmosis, see THOTHMES.

Tuticorin, tn on the sea-coast in SE. of Madras State, India. There is no harbour, but it is a port for steamers to Colombo, Ceylon. Founded by Portuguese in 1540, it was captured by the Dutch in 1658, and finally by the British in 1825. There is an old Dutch cemetery and a large Rom. Catholic church built by the Portuguese.

Tutor, in Scots law, the guardian and legal representative of the person and the administrator of the estate of a pupil, i.e. a male child under 14 and a female child under 12. T.s are either: (1) *nominate*, i.e. he who is named by the father or mother in a will or other document; (2) *of law*, i.e. he who succeeds by mere operation of law in the absence of nominate T.s (seldom resorted to); or (3) *dativo*, i.e. he who applies where no T.-of-law demands the office.

Tutulla, see SAMOA.

Tuva, autonomous Oblast in S. Siberia, bordering on Outer Mongolia. It is a half-forested mountainous area (66,100

sq. m.) traversed by the Upper Yenisey, with gold, coal, and salt deposits. Pop. (1956) 168,000, mostly T. (a Turkic-speaking people) and Russians (since 19th cent.). Sheep, goats, and cattle are raised, and there is some industry. The cap. is Kyzyl. T. was Chinese 1757-1912, became a Russian protectorate in 1914, a 'People's Rep.' in 1921, and was annexed by the U.S.S.R. in 1944. See W. Kolarz, *The Peoples of the Soviet Far East*, 1954.

Tuxtla Gutiérrez, cap. of Chiapas stato, Mexico, 265 m. SE. of Vera Cruz, and 50 m. SW. of San Cristóbal, convenient for the painted ruins of Bonampak. There is mining and fruit-growing in the dist., which also produces sisal, coffee, cattle, and tobacco. Tanning and indigo industries are carried on. T. G. is a modern city on the Pan-Amer. Highway. Pop. 15,900.

Tuymazy, industrial settlement in the Bashkir Autonomous Rep. (Russia), 110 m. W. of Ufa, a centre of the Tatar-Bashkir oilfields (oil extraction since 1937) and the starting point of a pipeline T.-Omsk.

Tuzla, tn in Bosnia-Herzegovina, Yugoslavia, on the Jala. It is a spa, an important rail junction, and a growing commercial tn, with coal, salt, textile, and timber industries. Pop. 31,250.

Tvardovskiy, Aleksandr Trifonovich (1910-). Russian poet. During the Collectivisation of Agriculture (q.v.) he reported it for local papers; in the Second World War he was a war correspondent. His best long poems, written in the Nekrasov tradition, spring from these experiences: *Murav's Country*, 1936, depicts the longing of the peasant for his own plot of land; *Vasily Terkin*, 1946, is a brilliant portrait of the Russian private soldier. As editor of the *New World* (foremost literary magazine in Russia) he took the initiative in 1953 in starting the post-Stalin 'thaw' in letters by publishing chapters of his poem *Far Distances*, in which he exposed the mechanism of ensuring authors' conformity under the Communist regime (see COMMUNIST PARTY OF THE SOVIET UNION; SOCIALIST REALISM; STALINISM), and sev. nonconformist articles by young critics, including a programmatic one 'On Sincerity in Literature' which substituted the criterion of sincerity for that of the 'party spirit.' T. was dismissed in 1954, but remains a leading figure in the intellectual opposition.

Tver, see KALININ.

Twaddell, see SPECIFIC GRAVITY; HYDROMETER.

Twain, Mark, see CLEMENS.

Tweed, riv. in the S. of Scotland, draining most of the E. portion of the Scottish lowlands. It rises in the Tweedsmuir Hills in SW. Peebles-shire and flows in a NE. direction, through the N. of Selkirk and Roxburgh to form the boundary between Berwickshire and Northumberland before entering the N. Sea at Berwick-on-Tweed. It drains an area of 1870 sq. m., and is one of the best salmon rivs. in Scotland, though the fisheries have declined in importance. The traffic on

its waters is chiefly confined to Berwick, and the riv. is navigable only in its last 6 m. Length 97 m.

Tweed, woollen fabric, manufactured in Scotland and Ireland and extensively worn. The Harris and Donegal tweeds are notable. The name seems to be a corruption of 'tweel,' or 'twill,' used for materials with parallel diagonal lines over the surface of the cloth.

Tweeddale, John Hay, Second Earl and first Marquess (1626-97), soldier and chancellor. He fought alternately for the royalist cause and for the parliamentarians: he fought for the king in 1640, and on the side of parliament at Marston Moor (1644); 4 years later he was again with the Royalists at Preston. In 1656 he was a member of Cromwell's parliament and, in 1663, president of the Scottish Council and, in 1664, extraordinary lord of session, but was dismissed for mitigating the harshness of proceedings against the Covenanters (1664). Eight years later, however, he was again a member of the Council. From 1692 to 1696 he was lord chancellor of Scotland, but was dismissed for giving his support to the Darien scheme.

Tweeddale, see PEEBLES.

Tweedmouth, part of bor. of Berwick-upon-Tweed (q.v.), Northumberland, England. It has a dock, and its industries include timber saw-mills and joinery works, a canning factory, and a bakery. Pop. 4600.

Tweedsmuir, Baron, see BUCHAN, JOHN 1st Baron TWEEDSMUIR.

Twelfth-Day, see EPIPHANY.

Twelve-note Music, new system of composition on which the later works by Schoenberg and the music of some of his disciples (e.g. Berg, Křenek, Pisk, Webern) are based. It abolishes keys and with them the predominance of certain notes in a scale (tonic, dominant, subdominant, and mediant), using instead the 12 notes of the chromatic scale, each of which has exactly the same importance as any other. This rules out any feeling of tonality and also discards the resource of modulation, so important to musical structure in the classical sense. In order to make sure that no note assumes an even temporary predominance, the rule has been estab. that a musical theme must invariably consist of all the 12 notes of the chromatic scale, and that each note must appear only once in its course (transposition into any octave being allowed); but this does not mean that all melodic patterns of T. M. are necessarily of the same length, for they may be given any rhythmic shape the composer desires, and these shapes may be varied throughout a work, though the order of the notes, once determined at his desire, may not. By way of change, however, 2 or more of the 12 notes may appear simultaneously instead of successively. Moreover, 3 ways of achieving melodic as distinct from rhythmic or harmonic variety are open to the composer. He may (1) restate his theme inverted (i.e. turned upside down); (2) in reverse or *cancrizans* (i.e. turned backwards); or (3) inverted and reversed at

the same time. That this very severely limits the composer is not disputed by the advocates of T. M., but they contend that some rules must be imposed if music is not to become merely chaotic. Adversaries hold that to establish new rules more tyrannical than those which are rejected can only result in some kind of musical mathematics, to which the defence would retort that there is much beauty in mathematics. It is too early to decide whether T. M. is likely to establish itself permanently, but it seems certain that it will never do so exclusively, as the major-minor diatonic system did establish itself in Europe for at least 3 cents. For the moment one may reasonably decide that, while obviously bad T. M. is no better than any other bad music, the best examples of it so far have shown that the system imposes some kind of mental discipline on a composer that may result in work of character and power, in spite of the evident fact that its ingenious devices, fascinating to the eye on paper, remain quite undiscoverable to the ear in performance. The final test, then, as in all music, must be sought, not in technique but in a composer's inspiration, and whether many composers in the future will be inspired by this system remains to be seen.

Twelve Patriarchs, Testaments of the, a series of writings purporting to give the dying speeches of the 12 sons of Jacob. Each speech develops into an exhortation to avoid some particular sin or practise some special virtue. It is a Jewish work of the 2nd cent. BC, but early underwent Christian interpolation. It is referred to by Tertullian and Origen.

Twelve Tables, The (Rom. law). The Duodecim Tabulae or T. T. was the earliest code of Rom. laws, and was mainly the work of the decemvirate formed expressly for the purpose of evolving such a code (451-449 BC). Prior to the promulgation of this code, law making was an exclusively patrician function, and the general body of the people had no means of ascertaining the state of the law. The T. T. were not a comprehensive exposition of law but merely a written statement of those aspects which dealt with everyday problems requiring adjudication. They provided a practical written code which incorporated those elements of customary law which were essential for the proper administration of justice. The T. T. formed the basis of later Rom. law which inspired many modern Continental legal systems.

The contents of the T. T. included such topics as the procedure in civil actions, contracts, recovery of debts, the powers of a *paterfamilias*, inheritance, property rights, *delicta* (i.e. crimes), and the prohibition of intermarriage of patricians and plebeians. In the study of Rom. law the fragments of the T. T. which are extant, together with the writings of Gaius (q.v.) and Cicero, and of other jurists such as Ulpian, are of the highest value in enabling us to ascertain the essential features of the private Rom. Law

at a period before it had become moulded to a more matured culture. See Livy, iii. 31-7; Cicero, *De Leg.* ii. *Rep.* ii. 37, 63; Gaius, *Dig.* x. 1; xlvii. 22, etc.; L. Schoell, *Legis Duodecim Tabularum; Reliquiae*, 1866; H. J. S. Maine, *Ancient Law*, 1861; W. A. Hunter, *Introduction to Roman Law*, 1950.

Twickenham, municipal bor. of Middx, England, on the N. bank of the Thames, opposite Richmond. Created a bor. in 1926, it was enlarged in 1937 to include the urb. dists. of Teddington, Hampton, and Hampton Wick (qq.v.). T. appears in the second oldest Middx charter (704), when the land was granted to the Bishop of London. Houses for the nobility began to be built here in the late 16th cent., and it became fashionable in the 17th cent. Among its residents have been Bacon, John Gay, Fielding, Lady Mary Wortley Montagu, Kitty Clive, the actress, Dickens, and Tennyson. York House (late 17th cent.), now the municipal offices, was once owned by James II when Duke of York (but its name appears to derive from an earlier owner); Queen Anne lived there as a child. Kneller Hall, built 1709-11 and since altered, was the house of Sir Godfrey Kneller, and is now the H.Q. of the Royal Military School of Music. But T. is chiefly noted for its associations with Pope and Horace Walpole. Pope's Villa, where he lived from 1719 until he d. in 1744, and where many celebrities met, was pulled down in 1807. Walpole settled in a cottage here in 1747, and in 1750 began to reconstruct it in Gothic style, progressively enlarging it with the help of several architects until the huge mixture of mansion and castle was completed in 1776. Strawberry Hill, as he named it, has had some influence on architectural taste. It is now a Rom. Catholic training college for teachers. The oldest surviving building in T. is the 15th-cent. tower of the par. church, retained when the church was rebuilt 1714-5. Pope is buried there. T. returns 1 member to parliament. Pop. 104,700.

Twilight. The diffused daylight which precedes and follows the passage of the sun above and below the horizon respectively is due to refraction, reflection, and scattering of the light of the sun by the atmosphere, chiefly by means of dust and water particles. Its brightness varies with these conditions, but mostly with the distance of the sun below the horizon; when the sun is well below the horizon the light may have been reflected many times. Two limits of T. are recognised: *civil twilight*, when the sun is more than 6° below the horizon and the light is considered insufficient for outdoor work; and *astronomical twilight*, which was determined in the 11th cent. as when the sun is more than 18° below the horizon. Beyond the Arctic and Antarctic circles T. increases according to season, extending over many weeks in the spring and autumn. Owing to the increasing angle at which the sun approaches the horizon towards low lat., the duration of T. decreases; it decreases also with altitude.

At Quito in Ecuador it is no more than 20 min.

Twilight Sleep, see **HYOSCINE**; **OBSTETRICS**.

Twill, woven fabric in which the warp is raised 1 thread and depressed 2 or more threads for the passage of the weft.

Twin Falls, city, cap. of Twin Falls co., S. Idaho, U.S.A., near Snake R. It is a processing and shipping centre for an agric., dairying, and stock-raising area. It produces canned fruit, meat and dairy products, flour, beet sugar, and beverages, and manufs. overalls, cement pipe, and farm machinery. Falls in nearby gorge (500 ft) of Snake R. have been diverted for hydro-electric power.

Twinkling, or **Scintillation**, of stars, is due to the refraction of their light rays in various directions by the earth's atmosphere. The air near the earth's surface is frequently in commotion owing to warm currents rising from the comparatively warm ground, cold currents descending, and horizontal movements of layers of different densities. There are also pockets in the atmosphere which act as lenses—concave and convex—dispersing and collecting rays of light, and as these pockets are moved by the wind, stars seen through them are never steady. T. is much more common with the stars and small planets, e.g. Mercury, because they do not present an appreciable disk to the eye, the light emanating from them like a ray, whereas the planets in general send bundles of light from the various portions of their disks. In the case of the larger planets the refraction effects of individual rays cancel each other out in the sum total of light reaching the eye, unless they are close to the horizon, when the atmospheric disturbances are considerable, and in such circumstances Venus, in particular, can frequently be observed twinkling. Like the planets in general, the Moon shines with a steady light, but if its disk is almost completely obscured by a fixed object as far away as convenient from the observer (the head being held steady) so that only a minute portion of the Moon's edge is exposed to view, T. will be noticed under suitable atmospheric conditions.

Twins generally denote 2 individuals produced at 1 birth. The term is used also to describe 2 similar and equivalent objects, e.g. twin crystals. In its strictest sense, however, the word denotes the result of the div. of an organism or of an organ into 2 equivalent organisms or organs. In consequence, although 2 animals may be developed and born at the same time, they are T. only if they are the products of the div. of a single fertilised ovum. Human 'twins' resulting from the synchronous development of 2 fertilised eggs are not true T. True T. are always of the same sex. Not infrequently one individual is larger than the other. Twins may be conjoined (see *under* **STAMINE TWINS**). Comparatively few early stages in the development of human T. from a single egg have been observed, but evidence shows that T. may develop in one of 3 ways: (1) The fertilised

ovum divides to form a mass of cells, the blastula. This may divide into halves which develop separately. (2) From the blastula, 2 gastrulae may be formed and develop into 2 individuals. (3) Early in development fission may occur along the axis of the embryo and so give rise to 2 partially or completely separate individuals. There is some evidence to show that the tendency to beget T. is inherited by males.

Two Sicilies, Kingdom of the, see **SICILY**.

Two-stroke Engine, see **MOTOR CYCLES**.

Two-toed Sloth, see **SLOTH**.

Tyburn: 1. Trib. of the R. Thames, England, now running completely underground, formed originally by the confluence of 2 streams from the Hampstead heights. It entered the flood plain of the Thames near the W. end of St James's Park, then divided into 3 mouths, 2 of them forming the is. of Thorney on which Westminster Abbey was built.

2. The historic Middx gallows, known as T. Tree, which stood at the W. end of Oxford Street. The first recorded execution took place in 1196, the last in 1783, when the place of execution was moved to Newgate (q.v.). A permanent gallows stood at the junction of Oxford St and Edgware Road from 1571 to 1759. Among those executed here were Perkin Warbeck and Jack Sheppard. In the 16th and 17th cents. numbers of Eng. Catholics were executed at T. See also **ST. MARLEBONE**; **OXFORD STREET**; **PADDINGTON**. See *Alfred Marks, Tyburn Tree, its History and Annals*, 1908; *A. S. Foord, Springs, Streams, and Spas of London*, 1910.

Tycho, see **BRAHE**, **TYCHO**.

Tye, Christopher, (c. 1500-1573), composer, b. probably at Ely. He may have been a chorister at King's College Chapel, Cambridge, where he was lay-clerk in 1537. In the early 1540s he became choir-master at Ely Cathedral, but resigned in 1561, was ordained and given a living at Doddington nr. Ely, where he d. His works include masses, motets, services, anthems, settings of metrical versions of *The Acts of the Apostles*, *In Nomines* for viols, etc.

Tydesley, urb. dist. of Lanes, England. The chief industries are cotton spinning and coal mining. Pop. 18,096.

Tyler, John (1790-1862), Amer. statesman, tenth president of the U.S.A., b. Charles City co., Virginia. He was called to the Bar in 1809, and in 1811 he was elected a member of the Virginia House of Delegates. In 1817-21 he was a member of the national House of Representatives, and in 1825-7 governor of Virginia, becoming a senator in 1827, when he showed his hostility to a high tariff policy. In 1840 he was elected vice-president, succeeding on Harrison's death to the presidency, in which capacity he stood as it were midway between the 2 great parties, without the support of either, for though he frequently showed himself in sympathy with the Whigs, he was never wholly one of their number; the Whigs themselves refused to acknowledge him as a member of their party. Besides the

Ashburton Treaty, the most important act of his administration was the annexation of Texas in 1845. His last years were devoted to the Confederate cause. See L. G. Tyler, *Letters and Times of the Tylers*, 1884-96.

Tyler, Royall (1757-1826), Amer. playwright and novelist, b. Boston, his original name being Wm Clark Tyler. Educ. at Harvard, he studied law, and was admitted to the Bar in 1780. In 1787 he wrote *The Contrast*, which is notable as the first comedy written by a native American and produced by a professional company, and the first play using local Amer. dialect for comic purposes. He also wrote *The Algerine Captive*, 1797, a fine picaresque novel, and sev. poems.

Tyler, Wat (fl. 1381), (Wat the tiler), leader of the men of Kent in the rebellion of 1381 in Richard II's reign. He is said to have killed a tax-collector for gross insult to his daughter, and the incident brought discontent in the SE. to a climax. The rebels marched on London, releasing John Ball (q.v.) from Maidstone Gaol on the way. They burnt Southwark Prison, plundered Lambeth Palace, broke into the Tower, and killed the Archbishop of Canterbury and Sir Robert Hales. At length T. and his men met the king at Smithfield, where the lord mayor of London, Sir William Walworth, killed T.

Tyler, city in Texas, U.S.A., 100 m. E. by S. of Dallas. It has various manufs., and is situated in a prosperous agric. region. Pop. 39,000.

Tylor, Sir Edward Burnett (1832-1917), anthropologist, b. London. One of the founders of modern anthropology, he was interested especially in the origins of religion and magic and propounded the theory of Animism, according to which primitive and early men attributed a soul to both animate and inanimate objects, this leading to a later belief in gods. His more important works are *Researches into the Early History of Mankind*, 1865, *Primitive Culture*, 1871, *Anthropology*, 1881.

Tympanites, see HOOVE.

Tympanum, in anatomy, the membrane between the external and the internal ear, sometimes called the drum of the ear. See under EAR.

Tympanum, in architecture, either: (i) in Classic buildings, the triangular space enclosed by the horizontal and raking cornices of a pediment (q.v.); or (ii) in Romanesque buildings, the semicircular space enclosed between the arch and the lintel of an arched doorway; or (iii) in pre-Reformation churches, a light screen of wood or lath-and-plaster (generally painted with a picture of the Last Judgment) filling the space between the rood-loft and the chancel-arch. See SCREEN.

Tynan, Katharine (1861-1931), poetess and novelist, b. Clondalkin, co. Dublin. A Rom. Catholic, she was educ. at Siena Convent, Drogheda. In 1883 she married Henry A. Hinkson, a lawyer. Her first book of poems, *Louise de la Vallière*, was pub. in 1885. Others are *Ballads and Lyrics*, 1891, *The Wind in the Trees*, 1898,

Innocencies, 1905, *Experiences*, 1908, and *Irish Poems*, 1913; her *Collected Poems* appeared in 1930. The first of her pleasant and sentimental novels was *The Way of a Maid*, 1895, and she wrote over a hundred, including *Dear Irish Girl*, 1899, *A Daughter of Kings*, 1905, *A Midsummer Rose*, 1913, and *The Infatuation of Peter*, 1926. She also pub. a series of autobiographical works, beginning with *Twenty-Five Years*, 1913, and ending with *Memories*, 1924. A well-known figure in the Celtic Revival, she was a close friend of Alice Meynell (q.v.).

Tyndale, William (c. 1490-1536), translator of the Bible, a native of Gloucestershire. In 1521 he became the chaplain and tutor in a household at Old Sodbury in Gloucestershire, but his sympathy with the new learning aroused suspicion and he removed to London; but finding it impossible to complete his trans. of the N.T. in that city, he went to Hamburg and ultimately to Cologne, where in 1525 he began printing the work. In 1528 he pub. *Parable of the Wicked Manmon* and the *Obedience of a Christian Man*, and was for a time in Henry VIII's favour, but having pub. *The Practice of Prelates* in 1530, he lost the king's goodwill. He was burnt as a heretic at Vilvorde, Netherlands. His fame rests upon his trans. of the Bible, consisting of N.T., Pentateuch, and Jonah. See lives by R. Demeaus, 1871, 1886; W. B. Cooper, 1924; J. F. Mozley, 1937.

Tyndall, John (1820-93), physicist, b. Leighlin Bridge, co. Carlow, Ireland. In 1848-50 he studied at the univ. of Marburg under Bunsen. In 1854 he became prof. of natural philosophy at the Royal Institution and was elected P.R.S. in 1852. He made important investigations in the Penrhyn slate quarries and in the Alps with Huxley, the result of their labours appearing in *The Glaciers of the Alps*, 1860. In 1859 he began his researches on radiation, and later studied the acoustic properties of the atmosphere. He was president of the Brit. Association at Belfast in 1874, and for some years was scientific adviser to the Board of Trade and to the lighthouse authorities.

Outside scientific circles, T. is remembered chiefly for his challenging address, before the Royal Institution, of which he was appointed superintendent in 1867, *The Influence of Material Aggregation upon the Manifestations of Force*, 1863, in which he claimed for matter the promise and potency of every form of life. Others of his works are: *Heat as a Mode of Motion*, 1863, *Fragments of Science*, 1871, 1879, *Floating Matter in the Air*, 1881, *Lectures and Essays*, 1903. See life by A. S. Eve and C. H. Creasey, 1945.

Tyndaris, see PATRI.

Tyne, riv. of N. England, formed by the junction of the N. and S. Tyne near the vil. of Hexham, Northumberland, flowing E. to the N. Sea at Tynemouth. Its total length is 45 m., and its prin. trib. is the Derwent. Newcastle, Gateshead, Wallsend, Jarrow, and South Shields are among the tns on its banks. The N. Tyne rises in the S. Cheviote, and the S. Tyne has its source near Crossfell in

Cumberland. The lower reaches form an important industrial area, especially for shipbuilding; depression in this latter industry during the 1930s caused great distress in the area. The riv. is navigable for ocean-going vessels to Newcastle.

Tyne Tunnel, see under JARROW.

Tynemouth, municipal, co., and par. bor., seaport, and market town of Northumberland, England, on the R. Tyne. An important seaside resort, its sands are overlooked by picturesque cliffs. Within its boundaries is the important ship-repairing and fishing port of North Shields (q.v.). During the trade slump after the First World War the dist. suffered acute distress. To avoid the recurrence of this the W. Chilton Trading Estate has been estab. by the Council, and it includes among its industries those of plastics, clothing, die-casting, confectionery, light engineering, and furniture. T. and the adjoining vil. of Cullercoats are almost entirely residential areas. Pop. 66,900.

Tynwald, legislative body of the Is. of Man, which with the Lieutenant-governor, the Council, and the House of Keys constitute the gov. The Tynwald Court controls the surplus revenue and appoints boards to manage the harbours, highways, education, local gov., and asylums, subject to the approval of the Lieutenant-governor.

Type, in chemistry, system used for indicating the structure of certain organic compounds, which were regarded as derived from sev. simple inorganic bodies by the introduction of various radicals. Gerhardt referred almost all substances to 4 typical molecules, viz., hydrogen, H; hydrogen chloride, HCl; water, H₂O; and ammonia, NH₃. Kekulé added a fifth T., methane, CH₄. Williamson introduced condensed T.s and Frankland from the T. theory was led to the theory of valency (q.v.). The term is now obsolete.

Type, in theology, see ANTITYPE.

Type and Typefoundry. As in the earliest days of most handicrafts the craftsman made his own implements and apparatus, so in the inception of typography the printer was his own typefounder; in fact, it was not until the 17th cent. that the arts of printing and letterfoundry were separated. In the second vol. of *Mechanick Exercises*, by Joseph Moxon (1683), is a very full and practical account of the making of type in his day, and the process remained much the same until the introduction of machinery for the purpose in the middle of the 19th cent., and with some modifications in the mould is still to a minor extent in use for the casting of small quantities of seldom-used sorts. Before describing the mould it will be necessary to give a description of the matrix, from which the face of the type is cast, and the punch, by means of which the letter is stamped into the matrix. The punch is a rod of steel about 2 in. long by 1 in. square for pica and smaller sizes, and upon the end of this the letter has to be engraved after the face has been ground true on an oilstone. The outlines having been marked out, the

counters are struck in with counter-punches; as the work proceeds impressions are taken in smoke on a smooth paper and compared with the model; this refers to hand-cut punches, but towards the end of the last cent. machinery was introduced which quickly produces the punches with an accuracy impossible in hand work. The matrix is a small oblong piece of copper, on one side of which and near one end an impression of the die is struck, after which the matrix requires careful adjusting that the impression may be of the correct depth and be in exactly the right position and in perfect alignment with the rest of the fount. In original hand casting the mould was made in 2 equal sections, of wood lined with iron, and each size of body required a different mould, though the width could be regulated to the width of letter required. When the 2 sections of the mould were joined in position, with the matrix in its place, a small chamber was left, having for its base that portion of the matrix on which the letter had been struck, and at its top a small hole with a funnel-shaped opening, into which the metal was poured as each type was cast, when, with a peculiar jerk of the left hand, which held the mould, the metal was sent right home to the deepest point in the matrix. When, on the metal cooling, the mould was opened, releasing the type with a tag of metal at the foot—the small quantity which was in the funnel-shaped opening of the mould—this had to be broken away, and afterwards a groove was cut across the bottom of the type where the tag had been. (For type-casting by machinery, see TYPE-CASTING AND TYPE-SETTING MACHINES.) The principal element in type metal is lead, varying from 89 per cent in Moxon's formula to 55 per cent in some modern ones, but the proportion is made to suit the size and character of the type to be cast. The other principal ingredients are tin and antimony, besides which copper, nickel, cobalt, iron, and bismuth have been used. When it is considered that a small type may run as many as 24 lines to 1 in., it will be seen what accuracy must be maintained in the moulds to get the body of each type to the standard size, and in the matrices that the alignment of the face and the thickness of line may be constant.

Moxon gives only 10 sizes of type, and of these there are 2 groups of 2, of which one is the double of the other, and 1 group of 3, English, 2-line English, and great Cannon, where the latter equals 4-line English, but there is no correspondence between the various groups. By the introduction from America of the point system a method was adopted showing the relative sizes of all types, the point coming out at approximately $\frac{1}{16}$ in., and sizes named by the number of points, thus effecting the standardisation of the depth of the types. Point size refers to the depth of a type body measured columnwise. Set size, or thickness, is the width of a type body. The varying set of different letters is inherent in the alphabet we use; i and w must be cast on different

thicknesses of body, but these are now being made proportional. It is to be noted that in typefounders' parlance each portion of a single type has its own special name.

There are now two standardised sizes of different types in use in the various countries of the world. One is the American 'point' system in use in America and the English-speaking countries; the other is the French 'Didot' system in general use on the European continent. The table below gives the traditional 'English' names and the measurements of the point system:

In considering the beauty of type and its legibility there are various things to be taken into account: the correct placing of the line on the body, so that the beard may be deep enough for the descending letters, and in the lower case that the face of the short letters should leave just the right proportion of space for the ascending letters; that the italic or any other face to be used with the roman should be in exact alignment with it; that the main strokes and hair lines should bear a due proportion to one another; and in the curved letters there should be that 'sweet driving of the fats and the leans

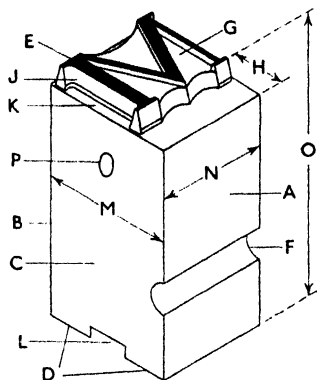
English	Point	Inch	Lines to 6 Picas (approx. 1 in.)	Corps (Didot)	Milli-metres	Inch	Lines to 6 Picas (approx. 1 in.)
	1	0.013883	72.00	1	0.376	0.0148	67.29
	2	0.0276	36.00	2	0.752	0.0296	33.64
Minikin	3	0.0414	24.00	3	1.128	0.0444	22.43
Brilliant	3½	0.0484	20.62	—	—	—	—
Gem	4	0.0553	18.00	4	1.504	0.0592	16.82
Diamond	4½	0.0622	16.01	4½	1.692	0.0666	14.95
Pearl	—	0.66	15.15	—	—	—	—
	5	0.0691	14.40	5	1.880	0.0740	13.45
Ruby (Agate)	5½	0.0760	13.08	5½	2.068	0.0814	12.23
	6	0.083	12.00	6	2.256	0.0888	11.21
Nonpareil	—	0.0833	11.95	—	—	—	—
Emerald	6½	0.0899	11.07	6½	2.444	0.0962	10.35
	7	0.0868	10.28	7	2.632	0.1036	9.61
Minion	—	0.0872	10.24	—	—	—	—
Brevier	—	0.1083	9.19	—	—	—	—
	8	0.1107	9.00	8	3.008	0.1184	8.41
Bourgeois	—	0.118	8.44	—	—	—	—
	9	0.1245	8.60	9	3.384	0.1332	7.46
Long Primer	—	0.135	7.22	—	—	—	—
	10	0.1383	7.20	10	3.760	0.1480	6.72
Small Pica	—	0.145	6.88	—	—	—	—
	11	0.1521	6.66	11	4.136	0.1628	6.11
	12	0.166	6.00	12	4.512	0.1776	5.60
Pica	—	0.1667	5.97	—	—	—	—
	13	0.1798	5.54	13	4.888	0.1924	5.17
English	—	0.188	5.29	—	—	—	—
	14	0.1936	5.14	14	5.264	0.2072	4.80
2-line Brevier	—	0.2166	4.59	—	—	—	—
	16	0.2213	4.50	16	6.016	0.2369	4.20
Great Primer	—	0.235	4.23	—	—	—	—
	18	0.249	4.00	18	6.768	0.2665	3.73
Paragon	—	0.2626	3.79	—	—	—	—
	20	0.2766	3.60	20	7.620	0.2961	3.36
Double Pica	—	0.289	3.44	—	—	—	—
	22	0.3043	3.27	22	8.272	0.3257	3.05
	24	0.332	3.00	24	9.024	0.3553	2.80
2-line Pica	—	0.3362	2.96	—	—	—	—
2-line English	—	0.375	2.65	—	—	—	—
	30	0.415	2.40	30	10.582	0.4145	2.40
	36	0.498	2.00	36	11.280	0.4441	2.24
	42	0.581	1.71	42	13.536	0.5329	1.86
	48	0.664	1.50	48	15.792	0.6218	1.60
	54	0.747	1.33	54	18.048	0.7106	1.40
	60	0.8301	1.19	60	20.304	0.7994	1.24
	72	0.996	1.00	72	22.560	0.8883	1.12
					27.072	1.0658	0.93

The Didot body (*corps*) is smaller than its point equivalent, e.g. *corps 6* has 11.21 lines to 6 picas (approx. 1 in.).

Type Design. The names of the various parts of the face of type are shown in the diagram on page 291.

into one another' of which Moxon speaks; and this letter characteristic should also be found in the joining of the serifs to the main stroke. Founts of type used for bookwork may be classed as the *old face*, the *old style*, of somewhat lighter face and

more regular appearance, and the modern face; and with the roman of each of these faces there is the corresponding italic. Besides these faces used for bookwork there are very many 'fancy' faces used for jobbing work, such as circulars, bill heads, cards, and advertising purposes; and the above-mentioned, as well as the fancy faces, are made not only to the standard set or thickness, but extended or condensed. The standard thickness is judged by placing the whole alphabet, *a* to *z*, in line, when they should measure about $12\frac{1}{2}$ ems of their own body. Again,



NAMES OF TYPE FEATURES

A, Front (of body); B, back (of body); C, shank; D, feet; E, face (of letter); F, nick; G, counter; H, beard; J, bevel; K, shoulder; L, groove; M, point size; N, set width; O, height to paper (distance from the surface on which the feet of the type rest to the face, i.e. the surface which takes the ink and prints the paper) equals 0.918 in. (Brit. standard); P, pin mark.

besides the letter faces of type there are chess and draught faces, playing-card and dice faces, music faces, shorthand faces, and many others. The system of logotypes, or types bearing a combination of letters frequently occurring in conjunction, has been tried, notably that under the patent of Henry Johnson, which was adopted by *The Times* in 1782, but apparently was not found to be so great a success as was anticipated. Indeed, unless such a combination occurs more frequently than the least used of the letters, it cannot be a time-saving device. The logotypes actually in use are *fl*, *ff*, *ff*, and *ff*.

See J. Moxon, *Mechanical Exercises*, 1683; P. S. Fournier, *Manuel Typographique*, 1764 (trans. H. Carter, 1930); J. Johnson, *Typographia*, 1824; T. Baines Reed, *A History of the Old English Letter Foundries*, 1887 (ed. by A. F. Johnson, 1950); G. Pollard, *Catalogue of Type-*

founders' Specimens, 1928; L. A. Legros and J. C. Grant, *Typographical Printing-surfaces*, 1916; W. Turner Berry and A. F. Johnson, *Catalogue of Specimens of Printing Types*, 1935; D. Thomas, *Type for Print* (2nd ed.), 1950; H. E. Waite, *Alternative Type Faces* (2nd ed.), 1951. See also bibliography of TYPOGRAPHY.

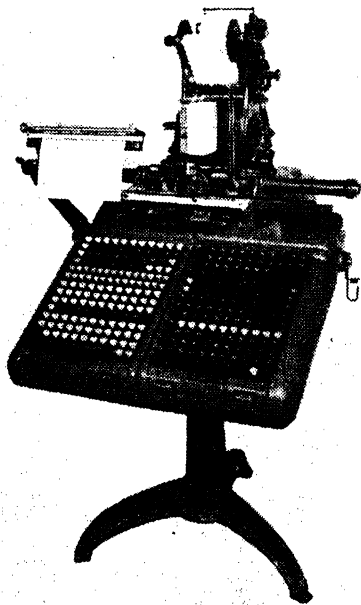
Type-casting and Type-setting Machines.

When machinery was introduced for type-casting, it was necessary to find some means of forcing the metal into the matrix, which in hand casting had been done by a jerk of the hand after the metal had been poured into the mould from the ladle, and the pump was introduced for this purpose in the early part of the 19th cent. It was also obvious that if any speed was to be maintained it was necessary to cool the mould by some artificial means; the expansion of compressed air was recommended for this purpose by Brunel, but at the present time water is generally used. The earliest machines for casting type followed closely the hand method, in that the mould was in 2 parts and was made to approach the nozzle of the pump, to recede from it when the metal had been delivered, to open and eject the type, repeating this action for each type cast. Such machines are still in general use, with the mould working on a pivot to and from the pump, with various cams to effect the opening and closing of the mould and the delivery of the type when cast. They were originally worked by a hand wheel, but now are made to use power, the various actions being controlled by springs. The type turned out by the hand machines, moreover, needs finishing after delivery. The improved pivotal machines, worked by power and water cooled, now turn out the finished type ready for use at the speed of 3000 ems per hour for pica or 12-point, or 7000 ems for nonpareil or 6-point; of course, with the larger sizes of type the production is much slower, as the type in the mould takes longer to cool. The Wicks Rotary Type-casting Machine was a vast improvement on any previous type-caster, and was constructed on an entirely different principle. Its chief characteristic is the mould wheel, working on a vertical shaft, and having 100 radial moulds. The type was cast in these moulds and ejected on to a delivery chain. According to the size of the type to be cast the speed of this machine varied from 30,000 to 60,000 per hour. The 'Super Caster' is the latest development of type-casting machinery, the product of which is not confined to casting type, for on it may be cast leads and rules in continuous strip, automatically cut to desired lengths, quotations, furniture, single or continuous borders, and much other material used by the compositor.

TYPE-SETTING MACHINES. These may be classified as: (a) those that set type that has been cast by some other machine; (b) those that cast their own type in the order in which it is required for printing the special work in hand; and (c) those that assemble the matrices for a complete line and then cast that line in a single slug. Dr W. Church invented in 1822 the

first type-setting machine. It belonged to type (u). Then followed a dozen or more proposals, among the more important being those of Bessemer, 1838, Young and Decambre, 1840, Hattersley, 1857, and Kastenbein, 1870, used at *The Times* from 1872 to 1905, when it was replaced by the Monotype machine. This type has been superseded by machines of the other 2 types. Of the second class of type-setting machines Monotype machinery may be taken as an example.

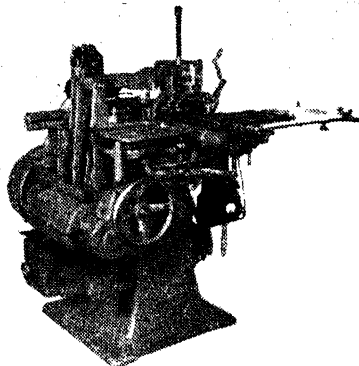
Monotype. These consist of 2 separate parts, a keyboard, which perforates rolls of paper (a translation of the copy into a series of perforations), and a caster, which these perforations guide in its automatic working. The keyboard is similar to that of a typewriter, and the characters are arranged on the same plan, but it is double and contains 301 keys, an arrangement of different colours indicating whether they belong to roman or italic; caps., small caps., or lower case; figures or sorts (special or unusual characters). Above the keyboard is a roll of paper which is



STANDARD MONOTYPE KEYBOARD

fed from one spool to another $\frac{1}{2}$ in. at the completion of each letter. Behind the keybanks is a series of 31 punches, and a combination of the positions of perforations from 28 of these punches is used to represent the different letters and spaces. Depressing a key actuates valves to

liberate compressed air, which sets in motion the required punches. Whilst the perforations for a line of type are being made a device is registering the thickness of every letter composed and counting the number of spaces, and at 4 cms before the completion of a line a bell rings, so that the operator may see if he can complete the word in hand or whether he shall



MONOTYPE CASTING MACHINE

divide it, or if the word is completed whether the next will come in complete or divided. Having included all that the line will contain, the line will need justifying. As the line approaches completion, the justifying drum rotates until it shows, by means of 2 figures one above the other which 2 keys are to be used to effect the justification of the line, which is accomplished on the caster by the setting of 2 wedges which divide the surplus space over the number of spaces in the line. The perforated ribbon is now ready to go to the caster, where it is paid in from the end and works backwards, for it is necessary that the justification wedges should be adjusted first, or the spaces would not be cast to the correct width.

The matrix case on the caster consists of a frame carrying 255 matrices, arranged in 15 rows with 17 matrices in each row, and each matrix is brought to casting position by the influence of compressed air passing through the combination of 2 or more corresponding perforations.

The ribbon perforated at the keyboard is transferred to the caster, and is fed to a take-up spool in a direction reverse to that in which it was perforated. The ribbon is led step by step beneath a tracker bar, and intermittently clapped over a series of 31 holes above 31 corresponding pipes. Where perforations occur the compressed air is conducted to beneath stop pins arranged in 2 groups at right angles to each other, so that a stop pin will rise on each block. Working over each group of stop pins are 2 sets of tongs, which reciprocate during each

revolution of the caster. The first pair of tongs causes a pair of jaws to contact the raised stop pin, at the same time taking a stop rack with it. This rack is immediately locked, and as the second pair of tongs meet, the jaws connected to them bring the matrix case up to the position indicated by the stop rack. The stop rack is then released ready to be taken to the next elevated stop pin.

In the meantime, as the matrix case is brought to position, a wedge is moved to a corresponding position for the purpose of limiting the distance to which the mould blade may be withdrawn, so that the type next to be cast will be correct to size. The matrix case then descends towards the mould, and a coned pin clamps the required matrix on to the mould in its exact required position, and a piston then pumps the metal into the mould, producing a type body with the characters shaped at the head. A trickle of water through the mould causes the metal to be instantly solidified. The matrix case then leaves the mould, permitting the type to be ejected, leaving the mould ready for the next cast to be made.

The types are ejected into a narrow channel, one by one, until the line is complete, and the justification perforations at the end of the next line are reached. These cause 2 further wedges to be adjusted, so that all the spaces in the next line will be cast true to size to make the line correct in width, and the casting of the next line is then proceeded with in similar manner. The types may be cast at the rate of 140 a minute for 12-point up to 180 a minute for 6-point or smaller, and the width of line may be cast up to 60 ems pica. The Monotype principle has been applied to film-setting or photo-composing (q.v.) under the name Monophoto. See also LANGSON, TOLBERT.

Linotype. Of the third class of machine the 'Linotype' may be taken as typical. It creates lines of metal, known as slugs, which can be used for direct printing, or, as in newspaper work, for making papier-mâché moulds from which stereotype plates are produced. Each of these lines of metal or slugs is the length and width of a line of type, and has on its upper edge the necessary type characters to print an entire line. Several lines of slugs produce the same appearance as lines of type which are composed of single types and serve exactly the same purpose. After use these slugs are melted down and used for recasting into other slugs.

The dominant feature of the Linotype is the individual freely circulating matrix. A matrix consists of a flat plate which has on its vertical edge a die or dies of a character, and has in its upper portion a series of teeth which are used for selecting and carrying it to its proper place in the magazine or container. This container has a series of grooves or channels along which the matrices slide on their edges and from its lower end they drop one by one when released by the depression of a key button.

A keyboard is used for assembling these various matrices in the order required

for making words. When the operator depresses a key it releases a matrix from the container or magazine above. The matrix falls down on a constantly revolving belt into a box, which represents the 'stick' of the hand compositor. After each word, a spaceband is inserted by depressing a key. When the matrices and spacebands have been assembled to fill a line the operator raises the whole line by depressing a handle on the right. Thereafter the entire operation of casting the line and returning the matrices to their original places is effected mechanically, and the operator can therefore begin to assemble the next line. The line is transferred to the front of the mould, which is slotted from the front to the rear and is of a size determined by the body and length of slug to be cast. While the line of matrices and spacebands is in front of the mould, the spacebands, which are double wedge-shaped, are spread upwards until the line is spaced out to the required measure. At this moment the slot in the mould and the dies of the row of matrices are filled with molten metal to produce a slug. The molten metal is contained in the pot behind the mould wheel, and is kept in a molten state within by a bunsen gas flame or by electrically heated elements. The molten metal is forced into the mould and the matrices by a plunger, which pumps the metal up the delivery mouth into the mould, where it solidifies and forms a slug.

After casting, the mould wheel containing the slug revolves and brings the slug into a vertical position, where it is pushed by an ejector through 2 parallel trimming knives into a tray or galley. At the back of the mould wheel is a knife which trims the bottom of the slug. While the slug is being trimmed and ejected, the matrices and spacebands, having finished their work, are returned for use to their original places. The matrices are first lifted vertically to an intermediate channel, thence they move laterally to the right until their teeth engage in the ribs of the bar which has descended to receive them. This bar then rises and lifts the whole line of matrices to the distributor mechanism at the top of the magazine. In the meantime the space bands, which have remained behind (because they have no teeth to engage in the bar), are transferred by a grabber to their original position in the box for use again.

The method by which each matrix is returned to its proper channel in the magazine is as follows. Each matrix has a number of teeth in the V formed by its top portion. These teeth are not the same in every matrix, but are arranged in a particular order or combination according to the characters they bear. Every character differs in its combination from a matrix bearing a different character, and the teeth play an important part in effecting the return of the matrices to their respective places. A rigid notched bar is fixed in position above the open ends of the magazine mouth, and is so made as to engage the teeth and hold them in suspension. The ribs of the bar vary in

number and continuance along its length. The matrices are pushed on the bar at one end and carried along it over the mouths of the channels. Each matrix is engaged by its teeth on the bar until it arrives over its proper channel, where the combinations of teeth allow the matrix to disengage so that it falls into its own channel. The matrices are carried along the bar by means of longitudinal screws, which lie below the bar in such a position as to engage the edges or lugs of the matrices and carry them along the bar. It is this system of the circulation of matrices and the fact that the operations of assembling them in one line, casting from them in another, and carrying them back to the magazine are concurrently effected without interference, that enables the machine to be operated at a speed beyond that hitherto attainable in type composition. The makers of the Linotype have developed a film-setter or photo-composer (q.v.) with the name Linofilm. See also MERGENTHALER, OTTMAR.

Another type of machine in this class is the *Intertype*, which resembles other line-composing machines only in general appearance and operating principles. One operator on an Intertype composes and casts type matter of all descriptions, ready for printing, in sizes from 5-point to 60-point, as well as rules and all kinds of decorative and spacing material. As many as 586 characters are available from one Intertype keyboard, and up to 12 'faces' or styles of type. The type is cast, a line at a time, from brass matrices. Up to 20 matrices of each letter or character to be composed are stored in magazines and released mechanically one at a time by the operator's touch on the keyboard. The released matrices are conveyed in correct order to an assembler (resembling the compositor's 'stick'), with wedge-shaped spacers between the words. When the complete line is assembled the operator releases it to the casting portion of the machine, where it is automatically justified against a mould of correct size and molten metal is pumped into the mould and matrices to form the line. The latter is then trimmed to dimensions accurate to within $\frac{1}{1000}$ in., and in its turn assembled on a galley in column or page form. Meanwhile, the machine automatically 'distributes' the used matrices and spacers back to their respective magazines ready to be used over again. The complete cycle of machine operations as here described happens 7 times each min. The outstanding feature of the Intertype is its simplicity when compared with other machines of its class. Included in the Intertype series is the *Intertype Photo-setter*, which sets type photographically as distinct from the setting and casting of type by means of the hot metal machine. See under FILM-SETTING; see also RIDDER, HERMAN.

The Ludlow System of Composition. This is essentially employed for the casting of display lines, with a comprehensive range of type faces in sizes from 6-point to 96-point. The units of the Ludlow

which make it a complete composing-room system are the machine, cabinets that each hold 20 fonts of matrices, spaces, and sticks. The complete necessary equipment can be contained in a floor area of only 10 ft by 6 ft. With the Ludlow system of composition, individual brass matrices are set or 'gathered' by a hand compositor from the matrix cabinet, and placed face downwards in a special stick, rectangular in shape with a screw clamp at the end. The 'gathering' of matrices is much quicker than picking up one type or one matrix at a time. This stick or matrix holder is then inserted in the machine, which ejects a certain amount of molten lead alloy through a mould into these matrices. The character contained on the working face of the matrix is faintly embossed on the back, together with an identification line, so the compositor can check the line.

Whatever the face size required, type lines may be cast on the Ludlow without mould, magazine, or other machine changes, since any variation in face-size is provided for by an overhang cast on both sides of the slug shank. This overhang is of ample thickness and strength, and is further reinforced by blank slug underpinning. From end view the Ludlow slug is T-shaped.

The machine is 4 ft wide, 3 ft 6 in. high and 3 ft from back to front, and has an electrically heated and automatically fed metal pot. The metal usually used is an alloy of 4 per cent tin, 12 per cent antimony, and 84 per cent lead, with a working temp. about 55° F. The machine is driven by a 1-h.p. motor, which also drives a small water pump circulating the water through the mould, keeping the mould relatively cool, and enabling repeat castings for as long as required at the rate of 6 slugs a min. In general practice only 2 body sizes of moulds are used, 6-point and 12-point, both 24 cms in length (see LUDLOW, WASHINGTON I.) The Hadego film-setter (q.v.), a photo-composer, has been claimed as a 'Ludlow' representation of this development.

Type Metals can have the following compositions: electrotypes, 94 per cent lead, 3 per cent tin, 3 per cent antimony; stereotype, 81 per cent lead, 6 per cent tin, 13 per cent antimony; Linotype, 84 per cent lead, 4 per cent tin, 12 per cent antimony; Monotype, 78 per cent lead, 7 per cent tin, 15 per cent antimony; Foundry type, 70 per cent lead, 10 per cent tin, 20 per cent antimony. *Electrotype* metal has the lowest tin and antimony content, since it is not required to resist wear and is used only as a backing to the copper sheet replica electroformed over the surface to be printed. *Stereotype* metal is cast in large plates against a fibre impression of the surface to be printed. Good castability is needed, but, unlike electrotypes, stereotypes are used directly for printing; hence they are harder, necessitating higher tin and antimony contents. *Linotype* is die cast by machines where speed is essential for the composition of newspaper type. Low melting point and short temp. range

during solidification are required. *Monotype* metal is also die cast by machine, but as only one character is cast at a time, a rapid cooling rate is possible, permitting harder alloys of higher melting range to give a high resistance to wear. *Foundry type* metal is used exclusively for cast type for hand composition, and requires the hardest and most wear-resistant alloy that it is practical to use.

Typewriter, writing machine operated by means of a manual keyboard for producing characters similar to those of printing. In 1714 a London engineer, Henry Mills, applied to the Brit. Patent Office for a patent for a writing machine, but nothing is known about this machine. In 1784 a Fr. invention appeared of a T. for the blind. The T. in its modern commercial form was invented in 1868 by 3 men, Scholes, Glidden, and Soule, working together, their experiments being financed by Denmore. Glidden and Soule retired from the experiments, and afterwards Yost was called in to express an opinion as expert mechanic. Acting on his advice, Denmore and Scholes in 1873 sold the rights to the Remington Arms Company for \$12,000. In 1829 the first Amer. machine was patented; and in 1833 the first Fr. machine. In 1843 Charles Thurber's T. was patented, but it was not practical. In England Sir Charles Wheatstone, in about 1845, invented several kinds of T. (see his models in the S. Kensington Museum). These attempts were followed by numerous others, particularly in the U.S.A.

All T.s for letter writing are alike in having keys which are depressed by the finger, thereby setting in motion certain levers and causing a letter to make an imprint on paper or other material. The imprint is made by the type striking an inked ribbon interposed between it and the paper. In some early machines, for example the Yost, an inked pad was used in place of the ribbon, the type rested on this and when the key was depressed carried sufficient ink on its surface to leave an impression on the paper. This method is now obsolete. The paper is fed round a cylinder called the platen, between it and small feed rolls. The letters all strike one spot, so the platen must move after each letter is used. It must also move to allow a space between words. This is done by the space bar, situated between the lowest row of keys and the frame of the machine. The platen is mounted in a carriage which is made to move in the direction of its length, and the platen revolves on an axle in the carriage, thus allowing the paper to be moved up at the commencement of a new line. The movement of the carriage is automatic and is caused by a coiled spring retained in a housing or drum to which is attached a fabric or cord drawband, this in turn being connected to the end of the carriage. By means of a ratchet attached to the centre spindle the spring may be wound to give the desired tension. A toothed rack running the length of the carriage engages a pinion which, by means of an escapement wheel and rocker, en-

sures that the carriage moves precisely one space on the operation of key lever or space bar. The revolving movement of the platen is made by the action of the lever provided to return the carriage to the position to commence a new line. The mechanism causes the platen to revolve a certain fixed distance, and this distance determines the space between the lines. Usually there are 3 of these fixed distances or spacings, single, double, or triple.

Modern T.s are all front-stroke machines, and most of them employ a type-bar, which is threaded on to a fulcrum wire passing through a shaped segment, the centre bars being almost straight and the angle of the heads becoming more acute as the bars at each end are reached. In this way it is possible to get the 45 or so bars necessary to give all the characters required in a comparatively small arc. Some machines, now obsolete, had the type on a drum, or alternatively a semi-circular band of metal, the key action causing this to move until the letter depressed was opposite the platen and in position for a comparatively short stroke on to it. These drums and bands were, on some makes, easily changed, enabling one to have various style types on the same machine. Another method, as in the Oliver, employed inverted U-shaped bars in plain bearings, the bars being arranged in banks each side of the machine and being drawn down to a central writing point by the action of the key levers. Yet another method still in use to-day is for each typebar to have a small ball-race at the fulcrum point, the lower part being fixed by screws and plates to a vertical piece of metal running across the machine.

A modification of the front-stroke machine is the Noiseless, which, as its name implies, is designed to operate with the minimum sound possible. This is achieved by arranging that steady pressure exerted on a key brings the bar up just short of the point of impact; when the key is struck staccato a weighted cam causes the bar to continue its travel after the actual finger pressure has reached its limit and so impresses the type, through the ribbon, on the paper.

Various methods have been tried to ensure the correct alignment of type, for not only is it necessary to have the letters equidistant, but they must also be 'on feet,' that is give an even impression over the whole of their surface, and the base of each letter must be in line with its fellows, with the exception, of course, of those which in the small characters extend below the line. To-day the general practice is to employ a type fork or guide into which the neck of the typebar enters just before the bar reaches the writing point.

The ribbon is mounted on 2 spools and passes through a guide behind the type fork. The spool that is driving is connected to the mechanism so that it moves the width of 1 letter each time a key is depressed, thereby causing the type to strike a different place each time. T.s

are now fitted with an automatic ribbon reverse so that when the spool on the right-hand side of the machine is full the drive is transferred to the left, and vice versa. Thus a ribbon fitted to a machine will continually travel to and fro while the machine is being operated. The ribbon guide rises each time a key is struck, and on the typebar resuming its rest position, falls back so that the letter is immediately visible. Most machines now are fitted with a $\frac{1}{4}$ -in. ribbon, and by means of a 3-position switch it is possible to type in 1 of 2 colours. The third position, stencil, as its name implies, is used when cutting stencils for reproduction work. When the switch is in this position the type strikes directly on to the stencil material, so destroying its ink-insulating properties and allowing ink to pass through when the stencil is fitted to the duplicator. In some cases the ribbon drive is out of gear when the stencil switch is used; this makes for more even wear, and consequently gives the ribbon a longer life.

The letters on the keyboard are not arranged alphabetically, but an arbitrary grouping has been adopted whereby the letters most used are in the middle and therefore directly under the fingers. The one now generally adopted for Eng. machines is as follows:

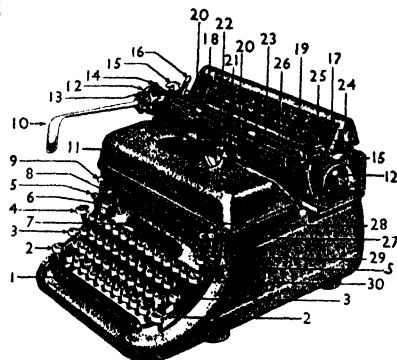
q w e r t y u i o p
a s d f g h j k l
z x c v b n m

Continental keyboards follow this arrangement with one or two changes of position. The numerals, punctuation marks, fractions, etc., vary slightly on different makes, although the tendency is now to standardise keyboards. Experiments have been made in alternative arrangements of the keyboard so as to bring those letters which are most commonly used underneath the fingers which are strongest. It has been found in practice, however, that this is neither faster nor easier for the typist to operate in spite of practice, and it seems unlikely therefore that the standard arrangement will be upset.

The earliest machines had only one set of type, capitals. Later models (from 1877 onwards) were fitted with another set of bars carrying the small letters; this necessitated, of course, a double keyboard, making a very unwieldy instrument. These were succeeded by the shift key T, where 2 or 3 characters are fitted to each bar and the shift mechanism moves the carriage in order to bring the paper into the correct relation with the letter required. A more modern design is the segment shift. In this case the type bar segment moves up and down instead of the carriage. The advantage is that the carriage is rigidly attached to the machine, and in consequence fewer links and connections are required; this arrangement also makes possible the interchangeable carriage which is a feature of some machines.

The general design of the T. seems to be fairly settled, but small improvements are constantly being made. All standard

office machines are fitted with a variable line spacer, which consists of a clutch inside the platen ratchet wheel. This is released by pressure on a boss protruding from the platen knob, and enables the platen to be turned independently of the ratchet, thus making it a simple matter to write exactly on lines. Tabulators increase the speed of operation when it is necessary to arrange work in columns for accountancy and general statistical purposes. On early machines this was done from a tabulator stop rack, calibrated in



Remington-Rand Ltd.

TYPEWRITER

Operating Parts. 1, Space bar; 2, shift keys (left and right); 3, shift lock (left and right); 4, back-space key; 5, keyboard margin control (left and right); 6, tabulator clear key; 7, tabulator bar; 8, ribbon reverse; 9, key-release lever; 10, carriage return and line-space lever; 11, snap-off top plate; 12, platen knob (right and left); 13, variable line spacer; 14, line space regulator; 15, carriage release lever (right and left); 16, ratchet detent or release lever; 17, removable platen brackets (right and left); 18, adjustable paper side guide; 19, paper-centring scale; 20, card holder (right and left); 21, aligning scale; 22, type guide; 23, paper bail; 24, paper-release lever; 25, paper-ball release; 26, carriage scale; 27, ribbon indicator; 28, personal touch regulator; 29, tabulator set key; 30, margin-release key.

spaces corresponding to the spaces on the machine and numbered for easy setting up. Tabulator stops or pegs were slipped to the rack where it was desired to begin a column. By pressing the tabulator key the carriage moved freely until contact was made with a stop. Some machines have a set of tabulator keys, so that by operating a particular key the machine will stop in the position required, passing over others until reaching the stop controlled by the key used. Another variation using 10 keys makes it possible to arrive at the correct position by using

only one key when typing figures, instead of using the old method of tabulating to the unit position and back-spacing to the required column for tens, hundreds, etc. The latest T.s have key-set tabulators. This method renders loose stops obsolete and enables the operator to set up the stops by means of a key on the front of the machine. The portable T.s were first introduced in 1912; nowadays all the leading makes of T.s have their portable products. There have always been a variety of type faces available for different kinds of T.s so as to produce different impressions. For the most part, however, the type faces were elite (12 characters to the in.) or pica (10 characters to the in.). The latest development is the introduction of shaded-face type, which again resembles printing, and this used in conjunction with a device for variable letter spacing can produce work which is almost indistinguishable from that of the printer.

Another development in T.s is the all-electric T. In this machine all functions are controlled from the keyboard. The carriage returns and is turned up the required number of spaces by the pressing of a key. The shift (which is of the basket type), as well as the type bars, is mechanically assisted. The keys are pressed, rather than struck by the finger, the key dip being only about $\frac{1}{4}$ in., from which point the bar is assisted up through the guide and on to the paper. Generally this is done by means of a rubber-covered roller situated underneath the machine. When the power is switched on this constantly revolves, and the action on depressing a key is to bring a serrated cam in contact with it. The roller flicks the cam over, which in turn brings the type bar up. The impression may be varied by altering the speed of the motor and consequently the driving roller. The advantages of this machine are greater speed, less fatigue, and perfect evenness of impression, as the action is purely mechanical and does not depend on the typist's touch.

A recent refinement in T.s is the introduction of mechanism to enable a piece of typescript to be produced with even margins on both sides of the paper. In the past it has only been possible to have a straight left-hand margin, and the right-hand margin has depended entirely upon the length and number of words. In printing, however, this is overcome by variable spacing between the letters, resulting in a solid block of type. The latest development in the T. makes it possible to compensate for incorrect spacing and so produce a piece of typescript laid out in the manner of printing. T.s are also modified for any language, special arrangements having to be made in the design for those (i.e. Hebrew, Arabic, and other Semitic languages) whose characters are written from right to left; for typing accents by means of dead keys; etc. Even Chinese has been attempted; an electric T. with 5400 ideographic type faces has been developed in America, on which a speed of

40-45 Chinese words per minute can be attained, the characters being arranged on a cylinder in 3 groups according to frequency of use, and the machine being operated by a keyboard with 43 keys. T.s are also manufactured for special requirements, allowing the typing of almost any sign or symbol used in business (£, \$, etc.), and the various accent marks (d, á, ù, ü, é, etc., etc.) used in many languages.

See R. T. Gould, *The Story of the Typewriter: from the Eighteenth to the Twentieth Centuries*, 1949; M. Crooks and F. Dawson, *Dictionary of Typewriting*, 1949.

Typha, genus of aquatic plants (family Typhaceae), with sword-shaped leaves and long cylindrical brown spikes of female flowers, surmounted by a slender deciduous spike of male flowers. *T. latifolia*, great reed mace, cat's-tail, or 'bulrush,' is a large and handsome plant. *T. angustifolia*, the lesser reed mace, is less common.

Typhoid Fever, see ENTERIC FEVER.

Typhon, or **Typhoeus**, a monster with a hundred heads buried by Zeus in Tartarus under Mt Aetna, the workshop of Hephaestus, though Homer places it under the country of the Arimi, lashed by Zeus with flashes of lightning. T. was the youngest son of Tartarus and Gaia, and by Echidna became the father of the dog Orthus, Cerberus, the Lernaean hydra, Chimaera, and the Sphinx; also of the dangerous winds, and the Harpies.

Typhoons, name of Chinese origin, meaning 'great wind,' now restricted to tropical revolving storms in the China Seas. They are essentially the same as the cyclones in the Indian Ocean or W. Indian hurricanes, and are formed in low lat. at all times of the year, but mainly in the late summer and early autumn; they move north-westwards, curving N., and finally move away north-eastwards before dissipating among the westerly disturbances. Although they move comparatively slowly, the winds circulating round are very high, and it is impossible to give an estimate of the maximum speed attained because the registering instruments are often destroyed by the wind. The lowest pressure ever recorded at sea level, 887 mb., was in the centre of a T. in the Pacific Ocean on 18 Aug. 1927. T. are notable for the patch of clear blue sky in the central calm area, which is nevertheless dangerous to sailing vessels; these are unable to keep way in the midst of great waves, and may be struck again at any moment from any direction as the storm travels on. The rapid fall of the barometer gives short warning of approach, but the navigator may be sure in his calculation of wind direction and find the safest path. To sailing vessels T. are very dangerous, but modern steamers can negotiate all but the most severe. They can be of sufficient violence to give rise to 'tidal waves,' which are destructive to ports and shipping. See CYCLONE; HURRICANE; TORNADO.

Typhus Fever (Gk *typhos*, mist or stupor), or Jail Fever, acute infectious

contagious virus disease, characterised by a high fever, severe nervous symptoms, and a peculiar rash. T. has been known in Europe since the 11th cent. The mode of its transmission was a discovery of the 20th cent. It was in 1909 that Nicolle and his colleagues showed it to be a louse-borne disease, and in 1916 Rocha-Lima demonstrated the aetiological agent, *Rickettsia prowazeki*. The conditions predisposing to it are bad sanitation, overcrowding, starvation, etc. The disease is most frequent in war-time, especially among prisoners and refugees and in invaded territories, as was exemplified during the First World War in Serbia, Rumania, and Poland, and during the occupation of Italy at the end of the Second World War. T. is chiefly confined to cold and temperate climates, notably Russia, Poland, and N. Africa. This incidence is not referable to mere cold, but to the overcrowding endemic in those countries, coupled with the greater possibilities for dissemination by infected lice. It is most frequent and characteristic in adults, but children are by no means exempt, though it usually assumes with them a milder form. The mortality has been estimated at about 18 per cent of cases, but the rate varies greatly according to whether the means of proper treatment are or are not available. The period of incubation is usually from 7 to 10 days, during which only a slight general debility is observed. The fever is ushered in with rigors, after which the temp. rises to 103° or 105°, attaining a maximum about the seventh day, when it remains steady or gradually becomes lower. The tongue is first of all coated with a white fur, which afterwards becomes yellow or brown. The teeth are coated with sordes. There is usually a degree of constipation and the urine is scanty. At the fourth or fifth day the characteristic eruption appears. This consists of spots or blotches of rose colour, appearing chiefly on the abdomen and flanks; they are for the most part petechial in character, that is, they consist of subcutaneous effusions of blood. The patient is very feeble and generally in a state of wakeful stupor, staring with contracted pupils and diminished capacity for perception. The crisis occurs about the fourteenth day, and if favourable is marked by a fall in temp., free perspiration, and amelioration of the distressing symptoms. Fortunately the synthetic antibiotic drug chloramphenicol has a rapidly curative effect on typhus and its related rickettsial infections. An effective prophylactic vaccine was produced in the Second World War, and this was found to confer a high degree of immunity to troops serving in T. endemic areas. Destruction of lice by 'D.D.T.' insecticide controlled the 1st epidemic previously mentioned. See S. B. Wolbach, and others, *The Etiology and Pathology of Typhus*, 1922; J. D. Rolleston, art. 'Typhus Fever' in *Dictionary of Practical Medicine* (ed. Sir M. Morris), 1921; H. Zinsser, *Rats, Lice, and History* (5th ed.), 1943; Manson's *Tropical Diseases* (14th ed.), 1954.

Typography. The term formerly embraced the whole craft of printing, but is to-day customarily used in the narrower sense to signify type designing. The quality of T., both in the design of the typefaces themselves and in their lay-out had declined in the second half of the 19th cent., and William Morris, drawing on Renaissance sources, re-affirmed the principles of good book T. that are alive to-day.

The essence of typographic design is fitness to purpose, and T. which hinders the reader's understanding of the printed message is bad. In advertising, choice and arrangement of typefaces can suggest the quality of the advertised product, or simply draw attention to it as forcefully as possible. The typography of books serves other needs. Fiction, poetry, books of reference, and children's literature are some of the more important categories which have their individual problems calling for different treatment, the first aim being readability in its widest sense. Book T. should not obtrude itself on the reader. Its basic principles are strongly traditional, and the designers' scope for initiative lies more in the title page and other preliminary matter rather than in the treatment of text pages. The policy of the manufacturers of modern type-setting equipment in reviving the best typefaces cut by printers of the past has been a major contribution to good typography to-day. See PRINTING.

See also D. B. Updike, *Printing Types, Their History, Forms, and Use*, 1937; S. Morison, *Four Centuries of Fine Printing*, 1925, *The Typographic Arts*, 1949, and O. Simon, *Introduction to Typography*, 1954.

Tyr, son of Odin, and a god of war. His right hand was sacrificed in battle with the monster Fenriswolf, son of Loki, in the great fight between the good and evil principles. He slew Garm, the hound of the Gnipa cave, but was mortally wounded in the conflict. From his name comes the word 'Tuesday,' through the A.-S. *Tīwes dæg*, Tyr's day.

Tyrant (Gk *tyrannos*), name given by the anc. Greeks to a man who availed himself of the discontent of a people to win popularity and then to overthrow the existing gov. and possess himself of the sole authority. Where a T. did not abuse his power, the people often fared better under a 'benevolent despot,' while a tyranny often encouraged new developments in the State. Such tyrannies arose most commonly in the 7th and 6th cents BC, and many of the T.s of this time have earned a high reputation by the impetus they gave to trade and commerce, and by their encouragement of the arts. The dislike of monarchs in general, however, led men to associate the name of T. with the idea of a cruel and arbitrary ruler, and its modern meaning is also largely due to the ultra-constitutionalists of the 4th cent. in Athens, to whom the democracy of Pericles was the ideal of gov.

Tyras, see BELGOROD-DNESTROVSKIY; DNESTER.

Tyrconnell, Richard Talbot, Earl of (1630-91), Irish soldier and administrator. A zealous Catholic, he was made lord-deputy of Ireland by James II in 1687. After the raising of the siege of Limerick by Wm III in 1690, T. followed James to France, but returned in the following year with a Fr. officer, St Ruth, who took supreme command of the Jacobite army.

Tyre (modern Sur), ant. in of Syria, built partly on an is. and partly on the mainland and said to have been founded in the 15th cent. bc. It was the prin. seaport of the Phoenicians, and as such known to the Greeks. It was originally a colony of Sidon, divided between the mainland and the is., which were linked by a causeway. As an is. fortress T. withstood many sieges, but was sacked by Alexander in 332 bc and did not recover. It was, however, a flourishing port under the early Rom. emperors, and a place of considerable importance in medieval history, especially as the stronghold of the Crusaders (1124-1291). But after the fall of Acre the Christians deserted the city, which was then destroyed by the Muslims. In Rom. and earlier times, it was famous for its silk and purple dye. The modern city is now a seaport in the Lebanese Rep. Pop. 6000.

Tyres, Rubber, are fitted to the wheels of road vehicles and aeroplanes to absorb shocks and to provide controlled steering behaviour. Pneumatic T. possess unique properties in these respects and also with suitable tread patterns provide road adhesion, and traction and 'floatation' for farm tractors and implements in soft ground conditions.

The pneumatic tyre was first invented by R. W. Thomson, a Scotsman, in 1845; his tyre was fitted experimentally to horse-drawn carriages of his day, but achieved little commercial success. In 1888 J. B. Dunlop, also a Scotsman, practising as a veterinary surgeon in Belfast, reinvented the pneumatic tyre. He used it to equip bicycles, where it was very successful in reducing the effort needed to propel these machines. The virtues of the pneumatic tyre gave a great impetus to the pastime of cycling, and led to tyre manufacture on a large scale. The successful development of the motor car was made possible by the manufacture of pneumatic car tyres, first made in 1895 by the Michelin Company in France. Pneumatic T. for aeroplanes were first made by the Dunlop Company in 1910; for heavy commercial vehicles in 1917, and for agricultural tractors in 1932, both by American companies.

The basis of the pneumatic tyre is an impermeable flexible container for air under pressure. This container is restrained from bursting by a non-extensible casing made from rubberised cords. These are usually of cotton, rayon, nylon, or steel wire. The casing is, in turn, protected from wear by a layer of tread rubber specially compounded to resist abrasion. The tyre tread usually has a form or pattern specially designed for the particular conditions of usage. T. are

supplied either with an inflatable rubber inner tube to retain the air or are tubeless; in the latter instance the air is sealed by a layer of rubber of low permeability bonded to the inside surface of tyre casing and by a tight compression seal of the tyre beads on the rim.

The first T. for mechanically propelled vehicles were made from layers of square woven canvas stuck together with rubber material. Such T. soon failed in service, due to the threads chafing against each other where they crossed. The use of a woffless parallel-cord construction brought about a great increase in tyre life. Covers are made with layers of these cord plies, varying from 2 to more than 30 in number. The cords in alternate plies cross those above or below at carefully chosen angles, usually in the range of 50-80°, and each cord is separated from its neighbours by a film of rubber. This arrangement gives a balanced stress distribution throughout the cover, with consequent freedom from fatigue failure. Another important milestone in the manufacture of pneumatic T. was the discovery that the addition of carbon black to the tread rubber compound considerably increases its resistance to wear. Carbon black was first used in pneumatic tyre treads in 1904 by S. C. Mote, an Englishman. Amer. makers followed this up by discovering that a special form of carbon black, made by burning natural gas, produced an even greater resistance to wear. This peculiar effect of carbon black on rubber is known as 'reinforcement'; further advance has been made by producing a range of 'furnace' blacks of very fine particle size by controlled combustion.

An important part of the pneumatic tyre is the bead construction, which serves to hold it on to the wheel. J. B. Dunlop's early T. of 1888 were wrapped on to the rim with a bandage of canvas. In 1890 C. K. Welch invented a cover with a completely inextensible bead, made by moulding steel wires into the bead structure. This construction almost completely supplanted the extensible beaded-edge type invented by W. E. Bartlett in the same year.

More recent trends in tyre development concern the use of alternative materials, largely of synthetic origin, alternative types of tyre construction and tread-pattern design, and an increasing need to make T. for special purposes as the variety and performance of pneumatic-tyred vehicles increase.

Intensive development work during the Second World War led to the large-scale production of various synthetic rubbers with properties from the tyre point of view largely complementary to those of natural rubber, hitherto exclusively used for tyre manufacture. A large proportion of the total rubber consumption by the tyre industry is now of synthetic rubber. Tyre cord materials are now almost exclusively of synthetic origin in place of cotton, from which tyre cords were originally formed. The prin. cord materials are high-tenacity rayon, specially designed for use in T., or nylon where

extra strength is required (such as in aeroplane T.).

Notable changes in tyre construction include the wide adoption of tubeless T., particularly for motor cars: a prime advantage of the tubeless tyre lies in the ability to retain air pressure for long periods even when punctured by a nail or similar object. Some T. are made with restraining layers of cord under the tread, to give extra stiffness and consequently better tread wear and road adhesion, though with some sacrifice in ride comfort. Tread patterns have become more complex, with intricate arrangements of moulded serrated grooves, slots, and 'knife cuts'; road adhesion, particularly

The inflation pressure used in T. varies from 300 lb. per sq. in. for some aeroplane T. down to 10 lb. per sq. in., or less where low tyre-to-ground contact pressure is needed, for travelling on loose sand or mud.

Whilst it is usually permissible to adjust inflation pressure by a small amount to cope more effectively with particular service conditions, it should be remembered that it is the air which mainly carries the load and that inflation pressure must be maintained within specified limits to ensure reliable tyre performance.

As a highly specialised engineering development, each particular type of

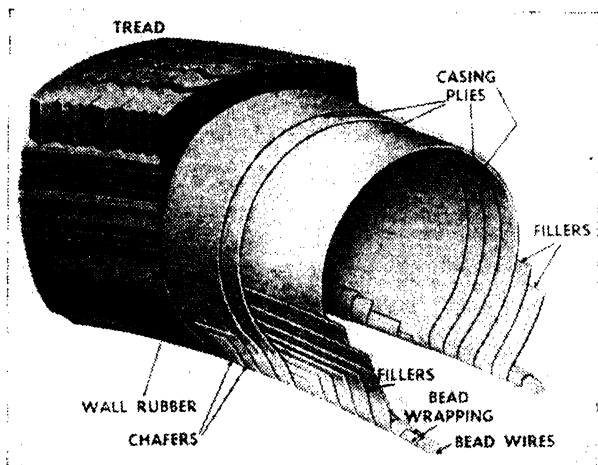


Photo: Dunlop Rubber Co.

STEP DOWN DIAGRAM OF CAR TYRE

in the wet, is improved, whilst running silence is maintained by making patterns basically of continuous rib design with non-repeating pattern elements (of irregular pitch) round the tread periphery.

Special-purpose T. include speed T. for fast cars, racing T. and T. for endurance records. Pneumatic T. were used for John Cobb's world speed record run in 1947, when a speed of 400 m.p.h. was attained. Speed T. are also made for fast buses and coaches.

T. with treads for use in ice and snow conditions are available for cars and buses. In the commercial vehicle field a wide variety of T. is made for differing conditions of service and terrain. 'Off the Road' T. range from special T. for lawnmowers to large T. for earth-moving equipment, which may be 8 ft in diameter and carry up to 20 tons load per tyre. The universal adoption of pneumatic T. for farm tractors and agric. machinery has accelerated the world-wide trend towards mechanisation in farming.

tyre represents a compromise between many often conflicting properties, and it is rarely possible to accentuate particular features, such as comfort or cornering stability, without adversely affecting other properties. This situation is causing an increasing number of special ranges of T. to be designed.

Tyrnovo, tn of Bulgaria, cap. of T. prov. (formerly Gorna Oryakhovitsa prov.), near the Yantra R., 120 m. E. by N. of Sofia (q.v.). It was cap. of the Bulgarian kingdom which was proclaimed here in 1186. The Bulgarian constitution was drafted here in 1879, and it was here that Ferdinand I (q.v.) declared the complete independence of Bulgaria in 1908 (see BULGARIA, History). There are sev. medieval buildings, and there are textile industries and an agric. mrkt. Pop. 17,000.

Tyrol, see TIROL.

Tyrone, Hugh O'Neill, Earl of (c. 1540-1616), Irish chief and rebel. He was brought up in England at the house of

Sir Henry Sidney. After 1594 he was engaged in frequent intrigues against Elizabeth, and he was defeated by Montjoy at Kinsale (q.v.) in 1602 while supporting the Spaniards who had landed there. He made his peace with James I, but, suspected of planning a revolt, fled from Ireland with the Earl of Tyconnell (the 'Flight of the Earls') in 1607. He d. at Rome.

Tyrone, co. in the prov. of Ulster, N. Ireland, bounded W. by Donegal, S. by Monaghan and Fermanagh, E. by Lough Neagh and Armagh, and N. by Londonderry. It is hilly in the N. and S., the prin. ridges being the Sperrin Mts (2240 ft) in the NE. and the Slieveveagh (1255 ft) in the S. It is traditionally called 'T. among the bushes' from its well-wooded valleys. The prin. rivs. are the Strule and its tribs., of which the chief is the Derg, the Blackwater, which forms its SE. boundary, and the Foyle, which bounds it in the NW. In the N. is a fertile plain, and agriculture flourishes. Oats is the chief grain crop, and potatoes, flax, and turnips are grown; a considerable area is occupied by pasture, and cattle are reared in large numbers; poultry and pigs are also kept. Sheep are raised in the valleys, and meat and eggs are exported to England. Coal is found at Coalisland, near Dungannon, but it is no longer mined. Linens and coarse woollens (including blankets), rayons, stockings, soap, candles, chemicals, earthenware, and other products of light industries are manufactured. T. returns 5 members to the N. Ireland Parliament, and with Fermanagh returns 2 members to the U.K. Parliament. There are sev. interesting ruins in the co. Omagh is the co. tn, and Clogher, formerly of eccles. importance, has a cathedral dating from the 18th cent. Its rivs. are famous for salmon and trout fishing. Area 1280 sq. m.; pop. 132,000. See Sean O'Faolain, *The Great O'Neill*, 1943; *Some Ancient Monuments in State Charge* (H.M.S.O.).

Tyrrrell, George (1861-1909), divine, b. Dublin, of a Protestant family. He entered the Rom. Catholic Church and became a novice in the Society of Jesus. He was ordained priest in 1891, but came into conflict with the Church for upholding modernism. Following an open letter he was dismissed from the Society of Jesus and suspended from the administration of the Sacraments in 1906. In Oct. 1907 he was excommunicated, but received absolution on his deathbed. He formed a close friendship with Baron von Hügel (q.v.) in 1897 which lasted until T.'s death. His best-known writings are: *Nova et Vetera*, 1897, *The Faith of the Millions*, 1902, *Hard Sayings*, 1904, *Through Scylla and Charybdis*, 1907 (wherein he evolved his idea of revelation as experience), *Medievalism*, 1908, *Christianity at the Crossroads*, 1909. See his *Autobiography and Life* (arranged by Maud Petre), 1912; A. Lolsy, *Tyrrrel et Henri Bremond*, 1936; life by J. Stam, 1938.

Tyrrrell of Avon, William George Tyrrrell, first Baron (1866-1947), diplomat, son of William T., a judge of the High Court of India. Educ. in Germany and at Balliol College, Oxford, he entered the Foreign Office in 1889, and was private secretary to Sir Edward Grey during the critical years leading up to the First World War. In 1925 he was appointed permanent under secretary of state for foreign affairs and was one of the ablest members of the Foreign Office and diplomatic service of his time. In 1935 he was appointed President of the Brit. Board of Film Censors. He was raised to the peerage in 1929.

Tyrrhenian Sea (anct Tyrrhenum Mare), name given to that part of the Mediterranean Sea which lies between the W. coast of Italy and the is. of Corsica, Sardinia, and Sicily (qq.v.).

Tyrtæus, Gk poet of the 7th cent. BC. He was probably a Spartan, and wrote military and elegiac poems. Fragments of his work are printed in E. Diehl, *Anthologia Lyrica Graeca*, 1949. See C. M. Bowra, *Early Greek Elegists*, 1938.

Tyrwhitt, Thomas (1730-86), classical commentator, b. London. He pub. eds. and emendations of classical authors, but his prin. work was the rediscovery of the rules of Chaucer's prosody. His linguistic attainments enabled him also to detect the Rowley forgeries (1777).

Tyumen': 1. Oblast in W. Siberia traversed by R. Ob', extends through tundra, forest, and wooded steppe zones. It has natural-gas deposits. Area 526,300 sq. m.; pop. (1956) 1,088,000, chiefly Russian (since 16th cent; also Tatar in the S., Khanty, Mansi, and Nenets (qq.v.) in the N.). There are dairy and grain farming in the S., hunting, fishing, and reindeer raising in the N. There are also timber and food industries. The prin. tns are T., Tobol'sk. Area of banishment and labour camps.

2. Cap., econ. and cultural centre of the above, the oldest Russian tn in Siberia. Its industries include shipbuilding for the Ob' basin, woodworking, tanneries, and food industries. It is an important riv.-railway transfer point. Pop. (1956) 123,000 (c. 1914, 50,000; 1926, 50,000). T. was founded in 1586 on the ruins of a Tatar tn, and was the 'Gate to Siberia' until the construction of the Trans-Siberian Railway.

Tyutchev, Fëdor Ivanovich (1803-73), a great Russian poet. He was a diplomat and censor, wrote magnificent metaphysical poems (*Silentiūm!*, 1833), and later political poems of nationalist and Pan-Slavic tendencies.

Tzetzes, Joannes (c. 1110-c. 1180), Byzantine scholar, b. Constantinople. His enormous industry found cause for lament in all the numerous literary subjects upon which he wrote, as well as in his letters and commentaries. The *Allegory on the Iliad and Odyssey* is ed. by P. Matranga in *Anecdota Graeca* I, 1850, and the *Chiliads* (a poetical miscellany) by Th. Kiessling, 1826.

U

U, twenty-first letter of the Eng. alphabet, and the last of the 5 vowel sounds, is intimately connected with *v* and *w*. In the N. Semitic alphabet, which, like all Semitic alphabets, was purely consonantal, there was a letter *w(aw)*, occupying the sixth place in the alphabet. When the Greeks took over the Semitic alphabet, one form of the *waw* became the Gk *digamma* (see **F**), while another form of it was taken into use as the vowel *upsilon*, and placed at the end of the Gk alphabet, following *tau*. In the Etruscan alphabet, which was a descendant of the Gk and the ancestor of the Lat. alphabet, the vowel *u* was written *V*. Also the Romans wrote *V*, which had the value either of the vocalic *u* or the consonantal *v*. In the early Middle Ages both the forms *V* and *U* were used indifferently for both the consonantal and the vowel sound, the sign *U* being used in hands current at this time. In the late Middle Ages *U* was mainly employed for the vowel *u*, but it still was interchangeable with *v* until the spelling settled down at the end of the 17th cent. The original sound of M.E. short *u* is preserved in such words as *put* and *pull*, while provincial pronunciation retains it more widely. For the pronunciation of *u* the breath passage is wider than for that of any other vowel, and hence its tone is low and vibrant. See **ALPHABET**.

Ubangi-Shari, ter., of Fr. Equatorial Africa, lying to the N. of the Middle Congo, cap. Bangui. It includes all the regions drained by the right-hand affluents of the middle Ubangi and also by its affluent, the M'Bomou, all of which affluents form the frontier with the Belgian Congo. It also comprises the basin of the Haut-Shari trib. of the Tchad. U.-S. is a succession of grassy plateaux cut with belts of forest which mark the valleys of numerous water-courses. Bangui is linked by regular steam-boat service with Brazzaville. There are over 300 m. of roads suitable for motor traffic in the colony. The products include palm kernels and palm oil, rubber, coffee, cocoa, ginger, sugar-cane, and rice. Cotton is the most important crop. The ter. is administered by a governor under the governor-general of Fr. Equatorial Africa. Area about 240,000 sq. m.; pop. (Africans) 1,066,000; (European) 1544 (1955).

Ubeda, Sp. tn in the prov. of Jaén. It has sev. fine churches, a palace, and Moorish walls and gateways. There is a large trade in oil. Pop. 30,450.

Uberaba, tn of Brazil, in the state of Minas Gerais, on the Rio da Prata, 300 m. N. of São Paulo, with which it is connected by rail. It trades in cattle and processes sugar and cotton. Pop. 43,900.

U-Boat, see **SUBMARINES**.

Ucayali, riv. of E. Peru, unites with the Marañon to form the prin. stream of the Amazon, 900 m. from its source. It is

navigable throughout for small craft. Its estimated length is 1000 m.

Uccello (c. 1397-1475), name given to the painter and sculptor, Paolo di Dono, from his love of painting birds. He was b. in Florence, trained as a goldsmith, and assisted Ghiberti on the doors of the Florentine Baptistery. U. is famous for his study of perspective. His 'Rout of San Romano' (1432) in the National Gallery, London, is a masterpiece of both fancy and formal design. See M. Salmi, *Paolo Uccello*, 1938.

Uccle (Flem. Ukkel), suburb of Brussels, Belgium. S. of the city. Near by are the Royal Belgian Observatory, built in 1883-91, and the park of Wolvendael, a remnant of the ancient forest of Soignes. U. has breweries, bleacheries, and manufs. of electrical instruments. Pop. 64,600.

Uckfield, par. of Sussex, England, on the R. Ouse, 8 m. N.E. of Lewes. Pop. 4032.

Udad, see **BARBARY SHEEP**.

Udaipur, former princely state of India, then part of Rajasthan State, of which the city became cap. The Maharana of U. is recognised as the foremost in rank of all Rajput princes. U. is a particularly fine city, situated on Lake Pichola in which the many is. are distinguished by marble-topped buildings. The city was founded in 1567, and parts of the imposing palace go back to that date.

Udal, see **ALLODIUM**.

Udall, or **Uvedale**, John (c. 1560-92), Brit. Puritan divine, who was prosecuted (1586) and deprived (1588) of his living at Kingston-on-Thames for his tracts against episcopacy. In 1590 he was condemned to death on a charge of complicity in the Marprelate tracts, but was pardoned in 1592. He wrote *The Key of the Holy Tongue*, a Heb. grammar and dictionary (pub. 1593).

Udall, Nicholas (1505-56), dramatist and scholar, b. Hampshire. Educ. at Corpus Christi College, Oxford, from 1534 to 1541 he was headmaster of Eton, and in 1554 became headmaster of Westminster. He is best remembered for his *Ralph Roister Doister* (†1552), the first Eng. comedy, an unpolished but lively piece, of which there are eds. by W. H. Williams and P. A. Robin, 1901, and by W. W. Greg, 1935.

Uddevalle, seaport in of Göteborg, Sweden. It has shipbuilding, wool and textile industries, wood-pulp mills, and sugar refineries. Pop. 27,491.

Udet, Ernst (1896-1941), Ger. airman, b. Frankfurt on Main. In the First World War he was one of Germany's most famous aces, with a record of 62 air victories. Later he took a major part in the development of the Luftwaffe.

Udine: 1. Prov. of Italy, comprising the greater part of Friuli-Venezia Giulia (q.v.). It is bordered on the N. by Austria, and is mainly in the Alps (q.v.),

but has a plain in the S. with a deeply indented coast-line on the Gulf of Venice (q.v.). It is watered by the Tagliamento (q.v.) and its tribs. Livestock, cereals, wine, flax, silk, and hemp are produced. The prin. tns include U., Codroipo, Cividale, and Aquileia (qq.v.). Area 2825 sq. m.; pop. 800,000. See **FRIULI**.

2. It. tn, cap. of the prov. of U., and chief tn of Friuli-Venezia Giulia, 285 m. N. by E. of Rome. It is built on a hillside, and is overlooked by an anct. castle, now a museum. The 13th-18th-cent. archiepiscopal cathedral has paintings by Tiepolo (q.v.). There was severe damage during the Second World War. The tn has textile, chemical, iron, and bell-founding industries. Pop. 76,000.

Udmurt Autonomous Republic lies in the E. of European Russia, between R.s Kama and Vyatka, in a hilly plain partly covered with coniferous forests. There are engineering, metallurgical (since 18th cent.), and timber industries; coarse grain and flax are grown, and dairy farming is practiced. The prin. tns are Izhevsk (cap.), Votkinsk, and Sarapul. The area belonged partly to the medieval Volga Bulgarian state and the Kazan' Khanate, partly to the Vyatka rep.; from the 15th to 16th cents. it was Muscovite. Votyak Autonomous Oblast was formed in 1920, and renamed U. in 1932. It has been a rep. since 1934. Area 16,200 sq. m.; pop. (1956) 1,285,000, mostly Udmurts and Russians (since 15th cent.).

Udmurts (formerly **Votyaks**), Finnish-speaking people (see **FINNS**) in Russia, living in the Udmurt Autonomous Rep. (q.v.) and adjacent areas, and numbering 606,000 in 1939. They are Orthodox Christians, mostly peasants, now collectivised. See W. Kolarz, *Russia and her Colonies*, 1952.

Ufa, city in the Urals, cap., econ. and cultural centre of the Bashkir (q.v.) Autonomous Rep. It is one of the main industrial centres of the Urals, with engineering (aircraft engines, electric and oil-industry equipment), oil refining (pipelines from Tuymazy and Ishimbay fields), wood-processing, and diverse light and food industries. It is also an important transportation centre. U. is the residence of the religious head of the Muslims of European Russia and Siberia (since 1788). It has a branch of the U.S.S.R. Academy of Sciences. It was founded in 1574 as a Russian fortress, has been a tn since 1586, and served as a fur-collecting centre: it has been prov. cap. since 1862, and during the 19th cent. was the centre of a growing trade in agric. products. The tn has had some industry since the 1870s, but there has been rapid industrial development since the 1930s and particularly since the Second World War. The Bolsheviks were overthrown in U. by the Socialist Revolutionaries in 1918, and soon U. Directory (q.v.) was formed. U. was taken by the Red Army in 1919, and in 1922 was included in the Bashkir Rep. against the will of the Bashkirs and made its cap. It was cap. of U. Oblast within the Bashkir Rep. 1952-3 (abolished).

Pop. (1956, with Chernikovsk, q.v.) 471,000 (4th in the Urals; c. 1914, 103,000; 1920, 98,000; 1935, 195,000; 1939, 246,000), mainly Russian.

Ufa Directory, anti-Bolshevik Gov. in Russia, set up in 1918 at the State Conference in Ufa which had been called by the Committee of Members of the Constituent Assembly. It was soon overthrown by Adm. Kolchak (q.v.). See also **CIVIL WAR, RUSSIAN; CONSTITUENT ASSEMBLY; UFA**.

Uffington White Horse, see **WHITE HORSES AND HILL FIGURES**.

Uffizi and Pitti Galleries. The U. and P. palaces of Florence contain 2 of the greatest collections of pictures in the world. Lorenzo the Magnificent was the virtual founder of the U., though it was left to Francis I, Ferdinand II, and Cosimo III to make the collections what they are to-day. The U. gallery takes its name from the Palazzo degli Uffizi, or Palace of the Offices, where the municipal gov. was carried on. The special pictorial treasures of the U., after the examples of earlier It. painting, from Cimabue, through Giotto, to Fra Angelico, are the 'Holy Family' of Michelangelo; the 'Adoration of the Magi,' by Leonardo da Vinci (unfinished); the 'Baptism of Christ,' by Verrocchio; many paintings by Botticelli; Piero della Francesca's portraits of the Duke and Duchess of Urbino; and many famous paintings by Raphael, Titian, and Giovanni Bellini. Botticelli's paintings include the 'Primavera,' 'The Calumny of Apelles' (painted as a tribute to Savonarola), 'Judith and Holofernes,' 'Pallas and Mercury,' 'The Birth of Venus,' and the 'Madonna of the Magnificat' depicting the boy Lorenzo and his brother Giuliano. Other popular favourites are Fra Lippo Lippi's 'Madonna and two Children' and Raphael's 'Madonna of the Goldfinch.' Also requiring mention are Luca Signorelli's 'Madonna and Child,' Bronzino's portraits of the later Medici, Correggio's 'The Repose in Egypt,' Titian's 'Madonna of the Roses,' Bellini's 'Sacra Conversazione,' and a wealth of other paintings by Titian, Bellini, and Giorgione which afford unrivalled opportunities to study the work of these artists in the Venetian room at the U., where they are concentrated. Among foreign works there are paintings by Rogier van der Weyden, Hugo van der Goes, Memling, Rubens, Van Dyck, Jordaens, and Gerard van Honthorst; while the Ger. school is represented by Cranach and Dürer. A section of special interest is that devoted to portraits of painters which has grown from the nucleus formed by Cardinal Leopold de Medici into a Pantheon of art. Like the U. collections, that of the palace of Luca P. was formed by members of the Medici family. The U. collections represent all It. art, but with special emphasis on Tuscan. The P. paintings, on the other hand, belong largely to one period, the mature period of It. art, when Raphael was dominant. Here are Raphael's 'Madonna del Granduca' (the Grand Duke Ferdinand III) and the 'Madonna della Sedia' (both known everywhere

through coloured reproductions), and also the same master's 'La Donna Velata' or 'The Fornarina' (baker's daughter and the artist's betrothed), his portrait of Pope Leo X and his 'Vision of Ezekiel'—all in one gallery of the P. Also famous is Giorgione's 'Concert'—sometimes attributed to Titian. Tintoretto is represented by some fine portraits, and Titian's works here include one known as 'The Young Englishman' (said to be the Earl of Arundel). Among other artists at their best in the P. are Andrea del Sarto, Fra Bartolommeo, whose masterpiece 'The Deposition' is here, and Filippino Lippi. Among foreign artists represented in the P. are Van Dyck, Rubens, and Sustermans. Smaller but also important galleries of Florence are the Accademia and the Museo di San Marco. One of the most popular pictures in the Accademia is Fra Bartolommeo's 'Vision of St Bernard'; others are Michelangelo's 'David' and the 'Prisoners.' In the Museo di San Marco are notable works by Fra Angelico.

Uganda, Brit. Protectorate in E. Africa, mostly within the basin of the Upper Nile, extending from 1° S. lat. to the N. limits of the navigable waters of the Albert Nile at Nimule. It is bounded by the Sudan, Kenya, Tanganyika, Ruanda-Urundi, and the Belgian Congo. The E. boundary runs from Mt Zulia on the Sudan border along the Turkana Escarpment to Mt Elgon (14,178 ft) and thence follows the Malawa and Sio Rs. to the N.E. waters of Lake Victoria. On the W. side are the Nile-Congo watershed, Lake Albert, the R. Semliki, the Ruwenzori Mts (16,800 ft), and Lake Edward. The area of U. is 93,981 sq. m., of which 13,680 sq. m. are water. The extreme distance from E. to W. is 350 m., from S. to N. 400 m. The Protectorate forms part of the central African tableland, the greater part having an altitude between 3500 and 4500 ft above sea-level.

PHYSICAL FEATURES AND CLIMATE. U.'s continental situation and its character as an inland plateau of very varying altitudes account for its climatic regions, and its general elevation explains the absence of the more enervating conditions usually associated with equatorial coastlands. Climatically U. may be divided into a number of distinct zones which, however, merge gradually at their borders: (i) The mt and hill zones, in which the vegetation varies with altitude. Above 14,200 ft there is perpetual snow, and the descent from these mts lies through stretches of alpine meadow, bamboo forest and bracken, and savannah. Then gradually upland conditions prevail, like those of the general plateau level. The chief peaks (besides Mt Elgon) are the 3 volcanoes of the Mufumbiro Mts. (ii) The wet N. and W. margins of Lake Victoria, with an average rainfall of 50 in. In this region is the Mabira Forest (120 sq. m.). (iii) The dry Ankole and Masaka grasslands, with a relatively low rainfall. (iv) The W. rift valley; this is thinly populated. The valley is occupied by a series of lakes and rivers,

Lakes Edward, George, and Albert; the Albert Nile and the Semliki R. (v) The Karamoja region, a land of small ann. rainfall and without permanent rivs. Deep wells provide water in the dry season. It carries a meagre pop. of semi-nomadic pastoralists. (vi) The plateau of tree savannah which has sufficient rainfall for agriculture on a large scale. Its chief feature is the Victoria Nile with its associated labyrinth of shallow waterways. There are many shallow lakes. The Kagera R., headwater of the Nile, touches the Protectorate's S. boundary. For the most part, however, the many rivs. of the U. plateau are sluggish vegetation-covered swamps; such are the Mpologoma, Seziwa, and Kafu. Only in hill regions and on the slopes to the W. rift valley are clear-running streams commonly found. Despite U.'s apparent wealth of lakes and waterways, the need of water conservation is a problem which occupied the gov.'s attention for many years.

POPULATION AND RACES. Three racial groups, Bantu, Hamitic, and Nilotic, comprise the African pop. of U., the Bantu constituting three-quarters of the total. They occupy the S. and E. portion of U., excepting the Teso country in the E. Prov. and some areas along the Kenya border. The Hamitic group (approximately 300,000) is represented by the Teso and by isolated units along the Kenya boundary. The N. and W. part is the home of the Nilotic tribes. The estimated number of Africans in U. is approx. 5,500,000. The European pop. is 7000 and the Asian 50,000.

PRODUCTION AND COMMERCE. U. is essentially an agric. country, and, except for the Karamojong in the NE. and the Bahima in the grasslands of the SW., who live chiefly by cattle-raising and trading, the natives are mostly peasant proprietors. There is, however, a demand for labour by non-native and African employers, mainly in Buganda and the E. Prov., in the cultivation of economic crops and in the seasonal occupation of cotton ginning. The mining areas of Ankole in the W. Prov. and the timber workings and sisal estates in Bunyoro also absorb a large amount of labour. Central U. is a densely populated country, fertile and capable of producing a large variety of crops, chiefly cotton, coffee, sugar, and tea. The prin. native food crops are plantains, millet, and sweet potatoes; maize, rice, sugar-cane, chillies, yams, groundnuts, sim-sim (sesame), and a little wheat are grown. There are some non-native estates, those owned by Europeans being engaged in the production of coffee and tea, while sugar and sisal estates are in the hands of Asians. Nearly 200 cotton ginneries, 2 sugar factories, and a distilling factory for the manuf. of power alcohol have been estab.; there are coffee-curing factories at Kampala, Masaka, and Bubulu. There are indications that a wide range of minerals exists, including gold, tin, tungsten, oil, wolfram, tantalite, bismuth, and mica. There are large deposits of salt in the Katwe and

Kasenyi crater lakes. U. has not yet exploited its mineral potentialities. Cotton is the main export (70,982 tons in 1954 valued at £20,877,232), followed by coffee (£13,477,528). Total exports, £40,574,810; imports (1954) £24,849,805. The U.K. is the prin. country of origin of imports (1954, 45 per cent); exports to U.K. 27 per cent, to India 23 per cent. Kenya and U. now constitute a single unit for the purposes of customs; virtual freedom of trade exists between the 2 ters. To a considerable extent the external

90,000 kW, which can be expanded to 150,000 kW. A 5-year Capital Development Plan was pub. in 1954 to cover the period 1955-60, envisaging a capital development expenditure of £30m. U. has received allocations of approximately £3m. from the U.K. under the Colonial Development and Welfare Acts.

Law. The civil law is based on Eng. and Indian law, as is the criminal law which has been codified. Native law and custom is recognised in local courts which have limited jurisdiction. There



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CATTLE IMPROVEMENT IN UGANDA

Improved feeding, including sweet potatoes with concentrates, has been largely responsible for an increased milk yield from the Ngander cows, one of which is shown in foreground.

trade of each is operated through common mercantile and transportation services, and the great bulk of both import and export business is handled at Mombasa, which functions as the main collecting and distributing centre of E. African trade.

INDUSTRIAL DEVELOPMENT. The gov. has estab. the Uganda Development Corporation Ltd., with an authorised capital of £8m. (£5m. issued 1956) to develop the resources of U. and to assist and encourage private enterprise in the estab. of new enterprises. Mineral deposits are likely to be developed by the corporation in partnership with private enterprise, and the corporation is already associated with the opening up of copper and cobalt mining at Kilembo. In 1954 the Owen Falls Dam at Jinja was completed and is capable of an output of

is a High Court presided over by the Chief Justice and 4 puisne judges. The Court of Appeal for E. Africa hears appeals from the High Court of Uganda.

DEFENCE. Internal security is in the hands of the local police, who have some military training. In 1955 the strength was 3479. There is a garrison at Jinja usually composed of one battalion of the King's African Rifles (q.v.).

RELIGION AND EDUCATION. The Protestant and Rom. Catholic churches have been working in U. for over 80 years and now have 1,250,000 adherents between them. (See also HISTORY.) There are also sev. hundreds of thousands of Muslims. The remainder of the pop. is pagan, though the desire for education brings many more into the orbit of the missions each year. The demand for

education seems insatiable, and £2,618,426 was allocated by the gov. in 1954. Nevertheless, the bulk of education is still provided by missionary societies. At the end of 1954 there were approx. 231,000 children in primary schools and 116,000 in secondary schools. Makerere College, Kampala, has achieved Univ. College status. There are 38 teacher's training colleges.

COMMUNICATIONS. The Kenya and Uganda Railway, which since 1 May 1948 has been amalgamated with the Tangan-

resolution was passed by a majority endorsing the introduction of common-roll elections in 1961 as the council's policy. This policy had already been announced by the governor in the Legislative Council in April 1956. At the time of the passing of these motions, the Legislative Council comprised 60 members, 30 members on the gov. side and 30 on the representative side, of whom 18 were Africans and 12 were Europeans and Asians; the African representative members were elected indirectly.



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EDUCATION IN UGANDA

African boys emerging from their classroom on their way home from the primary school provided by the owners of the nearby Kirwa Wolfram Mine.

yika Railways to form E. African Railways and Harbours, extends to Kampala and is being further extended some 200 m. to Kasese at the foot of the Ruwenzori Mts (see EAST AFRICAN RAILWAYS). There are 3000 m. of all-weather roads under the public works dept, and about 8000 m. of other motorable roads maintained by the native administrations. Public transport by bus is well organised. U. is well served by local and international air services.

CONSTITUTION AND ADMINISTRATION. In the U. Legislative Council on 8 Aug. 1957 a motion was carried unanimously, asking the gov. at Westminster to introduce direct elections throughout U. for 18 African representative members of the council in 1958. Early in Oct. a further

Until full self-gov. is attained in U., certain powers are reserved for governors. In practice, they are rarely used. For instance, the governor's assent must be obtained before a bill has any legal effect. Three courses are open to the governor when a bill is presented for assent. Subject to certain exceptions, he may give assent whereupon the bill becomes law; he can veto the bill, i.e. refuse assent; he can reserve the bill for Her Majesty's pleasure, which means that the matter of assent becomes the responsibility of the secretary of state whose duty it is to advise the sovereign. The sovereign also retains a general ultimate power to disallow colonial laws, even after a governor may have assented to them, though instances of disallowances are

extremely rare. Reserve powers are also possessed by the governor, and can be used at his discretion. Normally these powers are used only in an emergency, and are exercised only when necessary in the interests of public order, or other essentials of good gov.

HISTORY. In 1862 Speke and Grant were the first Europeans to reach the cap. of Mutesa, King of Buganda, near the present Kampala. In 1872 Sir Samuel Baker arrived at the H.Q. of the young King of Bunyoro, Kabarega, and proclaimed the formal annexation of Bunyoro on 14 May 1872, but friction ensued, culminating in the battle of Masindi on 8 June. Baker then retreated to Fatiko. Stanley visited U. in 1875, the first Eng. Protestant missionaries arrived in 1877, and in 1878 came Fr. Rom. Catholics. Christianity made headway up to the time of Mutesa's death in 1884, but his son, Mwanga, persecuted and massacred the missionaries' adherents, and was driven from his throne. In the same year control of the Brit. sphere in E. Africa had been assigned by Royal Charter to the Imperial Brit. E. Africa Company, and when the Anglo-Ger. Agreement of 1890 confirmed the inclusion in the Brit. sphere of present-day Kenya and U., Capt. (later Lord) Lugard (q.v.) was sent to establish the Company's influence in U. He found Mwanga restored with the help of his fugitive Christian subjects, and made a treaty with him, whereby the Company acquired a right to intervene in the internal affairs of his kingdom and assumed the responsibility for the maintenance of order. Meanwhile the Company, crippled by the cost of occupation, gave notice of its intention to evacuate U., and Sir Gerald Portal was sent out as Imperial Commissioner to make proposals for future governance. On 1 April 1893 he assumed on behalf of the Brit. Gov. the responsibilities of the Company in Buganda. The formal estab. of a protectorate over Mwanga's kingdom was postponed until 18 June 1894. In the meantime Bunyoro Prov. was conquered and its ruler, Kabarega, driven out. In 1896 the protectorate was extended to most of the other regions which are now included within the present U., and this term was thereafter applied to the whole ter., Mwanga's kingdom, which is the Buganda Prov. of to-day, being referred to as Buganda.

In the years following 1894 there was little development of the Brit. administration, whose resources were quite inadequate for the gov. of a vast ter. which extended as far E. as Naivasha. In July 1897, however, certain chiefs in Buganda were plotting a revolt, and on 14 Aug. 1897 Mwanga's infant son, Daudi Chwa, was proclaimed king with a regency of 3 leading chiefs. A few months later the very existence of the protectorate was threatened by a mutiny of the Sudanese troops. The heavy and unproductive expenditure in U. led the home gov. to reorganise the administration. This was done under Sir Harry Johnston, who went out as special commissioner at the end

of 1899. The affairs of Buganda were settled by the U. Agreement, 1900, and the foundations were laid of the present administrative system. Sir Daudi Chwa, kabaka of Buganda, died in 1939 and after a period of regency of 3 years, his son, Mutesa, succeeded to the throne. For subsequent hist., see the article **BUGANDA**. For more recent history of U. see under the subheading **CONSTITUTION AND ADMINISTRATION**.

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Uggero, see **OGIER LE DANOIS**.

Uggione, Marco da, see **OGGIONE**.

Ugjar, see **ALPUJARRAS, LAS**.

'Ugly Duchess, The,' see **MARGARET OF CARINTHIA**.

Ugo Buoncompagni, see **GREGORY (popes), Gregory XIII.**

Ugolino dei Segni, see **GREGORY (popes), Gregory IX.**

Ugolino della Gherardesca (d. 1289), It. soldier, immortalised in Dante's *Inferno* as Count Ugolino, attempted to usurp the gov. of Pisa. The Archbishop of Pisa, Roger de' Ubaldini, formed a conspiracy against him in 1288; and attacking U. in his palace, defeated and took him prisoner. He was eventually starved to death.

Ugrian Languages, group of 3 related languages including the Magyar and those of 2 small Siberian peoples, the Khanty and the Mansi (q.q.v.). U. L. are related to the Finnish group, and are often considered together with the latter as one Finno-Ugrian family.

Uheimir, El, see **KISH**.

Uhländ, Johann Ludwig (1787-1862), Ger. poet and literary historian, b. Tübingen. He studied law at Tübingen Univ. 1802-8. With J. Kerner he was at the centre of the famous circle *Der Schwäbische Dichterkreis*. In 1815 a first collection of U.'s poems was pub., and various fragments and essays followed. After a short stay in Paris (1810-11) to study medieval Fr. and Ger. literature, he became a solicitor in Tübingen. Three books, consisting mostly of national verses, pub. between 1815 and 1820, made him famous all over Germany, and he rapidly became a political leader in the fight of the people for their ancient and often promised rights. Politics drew him away from poetry for nearly 15 years. There is only one book during this period, about the Ger. medieval poet, *Walter von der Vogelweide*, 1822. He took a keen interest in literary research, and in 1829 the univ. of Tübingen made him a prof. of Ger.

language and literature. His poems included mostly ballads, romances, and a few folk songs.

A collection of U.'s works was pub. by H. Fischer in 1892; T. Hartmann ed. his diaries (1893) and his correspondence (1911-16). See lives by K. Mayer, 1867; H. Fischer, 1887; A. Hartmann, 1912; H. Schneider, 1920; A. Hübscher, 1938. See also A. Thoma, *Uhlans Volkslied-sammlung*, 1929.

Uhlans, Tatar name for a particular type of soldier, and adopted in Poland to denote cavalrymen employed in reconnoitring, outpost duty, etc. The name was later particularly applied to Prussian cavalry regiments armed with the lance, first formed in the 18th cent. and used for reconnaissance.

Uigurs, Uygurs, or Uighurs, the name now given to the Turkic element constituting the majority of the pop. of the Chinese prov. of Sinkiang, now known as the Sinkiang-Uigur Autonomous Region. There are also over 50,000 U. in the Soviet rep. of Uzbekistan and some thousands in Kazakhstan and Kirgizia. The name Uigur is found in the early hist. of the Turkic peoples, and U. were ruling Mongolia in the 8th cent. The Uigur empire was destroyed by the Kirgiz in 840, and the U. were thenceforward split into 2 kingdoms, one in Kansu and the other in Bishbalik and Karakhoja. Their later hist. is obscure, but the Uigur script was in use in Kansu until the beginning of the 18th cent. See 'Turks' in *Encyclopaedia of Islam*.

Uinta, mt range in NE. Utah and SW. Wyoming, U.S.A. The highest points are Gilbert Peak (13,422 ft), Emmons Peak (13,428 ft), and Kings Peak (13,498 ft). The Green R. and Uinta R. have out deep gorges in the range, which includes the High Uintas Primitive Area (381 sq. m.), set aside (1931) by the U.S. Forest Service.

Uinatheres, Eocene mammals belonging to the Dinocerata. They were large and ponderous, with short limbs, and pairs of horn-like swellings on the skull.

Uist, 2 is. of the Outer Hebrides, Inverness-shire, Scotland:

1. N. U. lies 8 m. SW. of Harris, and is separated from Skye by the Little Minch. It is 18 m. long, and from 3 to 14 m. wide, hilly in the centre and S.E., the highest peak being Mt Eaval (1138 ft). The E. has the 2 sea lochs of Eport and Maddy. Most of the pop. resides in the N. and W. where there are long stretches of arable land, with good grazing. There is a carding, dyeing, and spinning mill on the is. Lochmaddy is the chief vil. Pop. 2800.

2. S. U. is situated 7 m. S. of N. U., Benbecula lying between, and has a maximum length and breadth of 22 and 8 m. It is connected with Benbecula by a bridge. The prin. sea lochs, Boisdale, Skipport, and Eynort, are on the E. coast and provide good trout fishing. There is a seaweed factory for alginate products. Lochboisdale is the chief vil. Benbecula has an airport. Pop. 4800.

Uitenhage, tn in the dist. of U., Cape Prov., the centre of an agric. dist. It was named after Jacob Abram U. de Mist, who was sent out by the Dutch Gov. in the mid-18th cent. as Commissary-General to set up a new gov. The opening of the railway to Port Elizabeth made U. prosperous. Apart from railway workshops there are a tyre factory, a wool factory, tanneries, and car assembly plant. U. has a Dutch Reformed church with a massive bible inscribed by De Mist. Features of U. are the King George Monument, Maggenis Park, and Swartskops Valley. Pop.: (whites), 15,500; (Bantu), 16,918; (coloureds), 7161; (Asiatics), 373.

Ujiji, tn of Tanganyika on the E. shore of Lake Tanganyika, formerly a slave-trading centre. Pop. (African) 10,000.

Ujjain, tn of Madhya Bharat State, India. U. is one of the 7 sacred Hindu cities, and every twelfth year is the scene of the great bathing festival, the Kumbh Mela. It was once the cap. of Malwa. Maharaja Scindia of Gwalior has a palace here.

Ukelele ('the jumping flea'), Hawaiian guitar, introduced to the Sandwich Is. by the Portuguese in 1877 and more recently into Europe as a popular instrument. It has 4 gut strings and can be played from a notation resembling the old lute tablature.

Ukerewe, a group of is. N. of Speke Gulf in Lake Victoria, E. Africa. See VICTORIA, LAKE.

Ukkel, see UCCLE.

Ukraine, The (Ukrainian *Ukrayina*), constituent rep. of the U.S.S.R., lying in the SW. of European Russia, N. of the Black Sea and the Sea of Azov, and bordered on the W. by Rumania, Hungary, Czechoslovakia, and Poland. It takes second place in the U.S.S.R. (after the R.S.F.S.R., q.v.) in pop. (40,600,000 in 1956), and third place (after the R.S.F.S.R. and Kazakhstan, q.v.) in size, having an area of 232,000 sq. m. It is divided into 26 Oblasts. The cap. is Kiev. The U. lies largely on the Russian plain, which here forms the Poles'ye, Dnieper, and Black Sea lowlands, and the Volhynia-Podolia, Dnieper, and Donets uplands. In the W. lie the Carpathians and in the S. the Crimean Mts. The U. has rich deposits of iron ore (see KERCH; KRIVOI ROG), manganese (see NIKOL'POL'), coal (see DONETS BASIN), natural gas (see DASHAVA; SHEBELINKA), oil (see DROGOBYCH), mercury, salts, etc. The main rvs. are the Dnieper, Dniester, S. Bug, and Severskiy Donets, a trib. of the Don. The soils and vegetation form 3 latitudinal zones: mixed forests in the N. (see POLES'YE), wooded steppe with beech and oak woods, and steppe—the wooded steppe and the steppe having mostly fertile Black Earth soils. The Carpathians and the Crimean Mts have vertical vegetation zones. The climate of the U. is moderately continental, much warmer than that of central Russia. The S. shore of the Crimea has a Mediterranean climate.

Population. The density of pop. in the U. is slightly less than that of the Moldavian Rep., but higher than in the rest of the U.S.S.R. It is highest in the industrial Donets Basin, followed by the wooded steppe belt, the Poles'ye, and the steppe zone. Ethnically the pop. consists largely (75 per cent.) of Ukrainians, an E. Slav people closely related to the Great Russians and Belorussians. They are followed by Great Russians and Jews, both living in the U. throughout the U.; outside the U. the Russians live mostly in the Crimea (where they form the majority), the Donets Basin and other areas bordering the R.S.F.S.R., and in the S. Oblasts. Jews, and the minority of Poles in the W. U., were much more numerous before the Second World War. There were also large Ger. and Czech colonies which have disappeared, but there are still small colonies of Bulgarians and Greeks in the S. In the W. live some Moldavians (Rumanians) and Hungarians (in Transcarpathia). The Tatars of the Crimea were deported to Central Asia in 1944.

Economy. Both industry and agriculture are well developed in the U. Among the branches of industry, engineering occupies the first place, followed by metallurgy, chemicals, coal mining, and the sugar industry. Wheat, barley, rye, and oats are the main grain plants, and sugar beet and sunflowers are widely grown. The cultivation of rice and cotton on the shores of the Black Sea is a completely new departure in agriculture. Orchards are very common. Animal husbandry is mainly concentrated on pigs, cattle, and poultry. There is a dense transportation network, railways being by far the most important means of transport. Five main areas with different economic specialisation can be distinguished in the U.: (1) the SE.—Stalino, Lugansk, Dnepropetrovsk, and Zaporozh'ye Oblasts—with coal mining, metallurgy, chemical industry, and heavy engineering (see DONETS BASIN; SOUTHERN INDUSTRIAL REGION); (2) the NE.—Khar'kov, Poltava, and Sumy Oblasts—with a large and varied engineering industry; (3) the S.—Odessa, Nikolayev, Kirovograd, Kherson, and Crimea Oblasts—mainly agric., with food industries, agric. engineering, large seaports, and shipbuilding; (4) the Central—Kiev, Chernigov, Zhitomir, Cherkassy, Vinnitsa, and Khmel'nitskiy Oblasts—with diverse agriculture, particularly sugar-beet cultivation, sugar and other food and light industries, and varied engineering; (5) the W.—Rovno, Volhynia, Ternopol', Lvov, Droboych, Stanislav, Chernovtsy, and Transcarpathia Oblasts—with diverse but comparatively less-developed industries (food and light industries, oil and natural-gas extraction, and some engineering).

History. In antiquity the steppes of the S. U. were populated by Scythians (q.v.), on whose ter. Gk. settlers founded many colonies in the 8th–7th cents. BC (see BOSPORAN KINGDOM; CHERSONESUS), which later fell under Rom. domination.

In the 4th cent. AD the whole country was under the Goths, who were defeated here by the Huns when the latter began their onslaught on Europe. E. Slav (Russian) tribes—Polyane, Severiyan, Drevlyane, Volhynians, etc.—inhabited the forested and wooded steppe zones from the early Middle Ages. After a short period of Khazar (q.v.) domination they were in the 9th cent. included in the Kievan state (see KIEVAN RUSSIA), whose cap. and most other main centres were here. The steppe remained the home of the nomadic Pechenegs and Cumans (q.v.). After the break-up of Kievan Russia, and particularly after the Tatar conquest (see GOLDEN HORDE) in the 13th cent., the centre of gravity shifted to the W. (see GALICIA AND VOLHYNIA, KINGDOM OF). By the middle of the 15th cent. most of the U. was under Lithuania, while in the SE. the Crimean Khanate (q.v.) was formed. The Lithuanian-held ter. became Polish in 1569, and soon the struggle of the local Russian Orthodox pop. against the Polish Catholics began both in the religious and cultural (see BRATSKVO) and in the social and economic spheres. Particularly militant were the Cossacks (see COSSACKS; SICH), who in the mid-17th cent. rose and won independence from Poland for the central U. (see KHMELEVNITSKIY; UKRAINIAN HETMANS), and brought about a union with Muscovy of 1653. The U. W. of the Dnieper remained Polish until the partitions of Poland in the 1790s. The Black Sea shores were captured by Russia from Turkey during the 18th cent. (see NEW RUSSIA; and for the hist. of Bukovina, Crimea, Galicia, and Transcarpathia see relevant articles).

During the 14th–16th cents. the pop. of the U. had developed a separate identity and a certain degree of national consciousness, distinguishing themselves from the Russians of Muscovy (q.v.: 'Muscovite' is still the Ukrainian colloquialism for Great Russian). A romantic literary Ukrainian movement began early in the 19th cent. The most celebrated Ukrainian poet was T. G. Shevchenko (q.v.). Pubs. in the Ukrainian language were forbidden by the Russian Gov. after the Polish uprising in 1863, and only the revolution of 1905 (q.v.) removed this prohibition. At the beginning of the 20th cent. a nationalist trend appeared which favoured autonomy for the U. This autonomy was granted, after the Feb. revolution (q.v.) in 1917, by the Provisional Gov. (q.v.), which recognised the authority of the Ukrainian Central Rada (Council) over the central U. After the seizure of power by the Bolsheviks (see OCTOBER REVOLUTION) the Rada, headed by Brushevs'kyi (q.v.), proclaimed the U. an independent rep. During the Civil war (q.v.) the U. was one of the areas most fiercely contested, and saw Ger. occupation and various Ukrainian nationalists (see UKRAINIAN DIRECTORY), White Russian (see DENIKIN; WRANGEL), Communist, and Anarchist (see MAKHNO) govs. and authorities. The Ukrainian Soviet Rep. was first proclaimed in Dec.

1917. When the Union of Soviet Socialist Republics (q.v.) was formed in 1922 it became one of the 4 original constituent reps. At first the Communists (see COMMUNIST PARTY OF THE SOVIET UNION) co-operated with the nationalists in carrying out a policy of 'Ukrainisation,' but since the late 1920s all real or suspected nationalists have been severely persecuted, particularly during the Great Purge (q.v.). However, 'bourgeois-nationalist deviation' persisted and received a new impetus during the Second World War, when the U. was occupied



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A GRAIN ELEVATOR IN THE UKRAINE

by the Germans. In the W. U., annexed from Poland in 1939, nationalist guerrillas operated for sev. years after the Second World War (see BANDERA). The Ukrainian Soviet Rep. is separately represented in the U.N. See W. E. D. Allen, *The Ukraine; A History*, 1940; M. Hrushevsky, *A History of the Ukraine*, 1941; C. A. Manning, *Ukrainian Literature* (Jersey City), 1944, *The Story of the Ukraine* (N.Y.), 1947, and *Twentieth Century Ukraine* (N.Y.), 1951; W. H. Chamberlin, *The Ukraine*, 1945; J. S. Reshetar, *The Ukrainian Revolution, 1917-20* (Princeton), 1952; R. E. Pipes, *The Formation of the Soviet Union* (Cambridge, Mass.), 1954.

Ukrainian Directory, ephemeral nationalist gov. in the Ukraine 1918-19, headed first by the author V. Vynnychenko, then by S. Petlyura, commander of the Ukrainian nationalist troops. Composed of people of divergent political views, it soon disintegrated.

Ukrainian Hetmans. From late 16th cent. H. was the title of the highest officer of the Zaporozh'ye Cossacks (see SICH); 1648-1764 it was the title of the head of the Cossack state, with administrative authority. In 1918, under Ger. occupation, the title was re-established and Gen. P. Skoropads'kyy ruled the country as a H. for 7 months.

See also HETMAN; UKRAINE, THE, *History*.

Ulan Bator, see URGU.

Ulanova, Galina (1912-), Russia's leading ballerina. Originally a member of the Leningrad Theatre of Opera and Ballet, where she created the roles of Maria in the *Fountain of Bakhchisarai*, 1934, and Juliet in *Romeo and Juliet*, 1940, she joined the Bolshoi Theatre, Moscow, in 1944, where she created the title-roles in *Cinderella*, 1945. She led this company on its visit to London in 1956, when she was acclaimed as the greatest present-day interpreter of Giselle.

Ulan-Ude (formerly Verkhneudinsk), tn in SE. Siberia, cap. (since 1923), economic and cultural centre of Buryat-Mongol Autonomous Rep. (q.v.). It is situated in W. Transbaikalia, on the Trans-Siberian Railway, and is a major industrial centre (since the 1930s—locomotives, glass, timber, and food industries). It is also the starting-point of the railway line to Ulan-Bator (Mongolia)—Peking. U. had been known since 1666 as a Russian fort, has been a tn since 1775, and had an annual fair attended by merchants from all Siberia. It was made cap. of the Far Eastern Rep. (q.v.) in 1920. Pop. (1956) 158,000 (1926, 29,000; 1939, 129,000), mainly Russians.

Ulbricht, Walther (1893-), Ger. politician. He joined the Communist party in 1919 and was a member of the Reichstag 1928-33. Subsequently he worked for the Communist party in Moscow, returning to Germany after the Second World War. He quickly became the most powerful figure in E. Ger. politics and since 1949 has been deputy Prime Minister of the Ger. Democratic Rep. His real authority rests, however, in his position as first secretary of the Politburo of the Socialist Unity party.

Uloer, gradual destruction of tissue on the surface of skin or mucous membranes as a consequence of infection or injury. In most cases an U. is a healing process by which diseased tissue is gradually dissolved in an 'ichor,' while the area of the sore diminishes, a scar or cicatrix taking the place of the ulcerated surface. In some cases the toxic element is too powerful for the normal healing process, and the U. tends to spread. See VARICOSE VEINS.

Ulcinj (It. Dulcigno), tn in Montenegro, Yugoslavia, on the Adriatic. It was under Turkish rule until 1880. There are magnificent beaches and mineral springs. The tn is enclosed by forests and hills, and has Rom. walls and a medieval castle. It has a trade in fruit and agric. produce. Pop. 5000.

Ulsåborg, see OULU.

Ulema (Arabic 'ulamā', a plural, learned men). The final authority in Muslim life is the scholar who knows the laws laid down in the Koran and the developments from them created by generations of canonists and accepted by scholars. These canonist-theologians are the U. pre-eminently, though the term is applied to all scholars collectively. In Egypt the heads of the 4 legal schools, the chief

judge, the head of the sheriffs (q.v.), and some others formed the council of the U., which could control the acts of the most arbitrary governors.

Ulex, genus of Leguminosae, found in W. Europe and N. Africa. *U. europaeus*, Furze, Gorse, Whin, *U. gallii*, and *U. nanus* occur in Britain.

Ulexite, mineral, hydrated sodium and calcium borate, occurring in fibrous rounded masses, known as 'cotton balls' in Nevada and California. It is also found in Peruvian and Chilean lake-deposits. From it are obtained borax and boric acid.

Ullas, see **WULFILA**.

Ullanov, see **LENIN**.

Ullanovsk, see **UL'YANOVSK**.

Ullasutai, tn of Outer Mongolia, at the confluence of the U. and Bogdo rivers, S. of the Khangai mts. It is a trading centre, particularly for cattle.

Ullage, vol. of available space in a container unoccupied by contents. Hence ullaging, a method of gauging the contents of a tank by measuring the height of the liquid surface from the top of the tank.

Ullapool, vil. of W. Ross, Scotland, on the E. side of Loch Broom. It is the major herring fishing port of the NW. Highland coast. Pop. 700.

Ullswater, James William Lowther, first Viscount (1855-1949), politician, educ. at Eton and Trinity College, Cambridge. Called to the Bar in 1879, in 1883 he was returned to Parliament as a Conservative for Rutland. He represented the Penrith div. of Cumberland, 1886-1921. In 1905, he became Speaker of the House of Commons. He was raised to the peerage in 1921.

Ullswater, second largest lake in England, between Westmorland and Cumberland, 8 m. long by $\frac{1}{2}$ m. broad and 210 ft deep. Aira Force (70 ft) falls on the W. side.

Ulm, Ger. tn in the *Land of Baden-Württemberg* (q.v.), on the Danube (q.v.) at its confluence with the Iller, 44 m. SE. by E. of Stuttgart. It is connected by bridges with Neu-Ulm on the r. b. of the Danube in Bavaria. U. was originally a settlement of the Alemanni (q.v.). It was razed in 1134, and was rebuilt by the Hohenstaufen (q.v.), and was made a tn by the Emperor Frederick I (q.v.). In the Middle Ages it was an important mkt on the trade route to Italy and the Orient. Its prosperity declined during the Thirty Years' War (q.v.). In 1805 Napoleon defeated 60,000 Austrians under Mack (q.v.) at U. During the Second World War there was severe damage. U. has a magnificent Gothic cathedral (begun in 1377), the spire of which is 528 ft high; the building has 5 naves, and has fine carvings, frescoes, and stained glass. There are other notable churches, old towers and houses, a 14th-cent. *Rathaus*, and another *Rathaus* in late-Gothic and Renaissance styles. The tn is a centre of communications, and has machinery, textile, and leather industries. It was the bp. of Einstein (q.v.). Pop. 86,000.

Ulmaria, see **MEADOW SWEET**.

Ulmer Dog, see **GREAT DANE**.

Ulmic Acid, see **HUMUS**.

Ulmus, see **ELM**.

Ulna, inner and larger of the 2 bones of the forearm, running from the wrist to the elbow. It articulates with the humerus and the head of the radius above and the radius and carpus below.

Ulpilas, see **WULFILA**.

Ulpian, Domitius (c. AD 170-228), Rom. jurist, b. Tyre. He wrote many works, extracts from which form about one-third of Justinian's *Digest*.

Ulrich von Hutten, see **HUTTEN**.

Ulster, N. prov. of Ireland, anct seat of the O'Neills, comprising the cos. of Cavan, Donegal, and Monaghan (Rep. of Ireland), and Antrim, Armagh, Derry, Down, Fermanagh, and Tyrone (N. Ireland). Area 8553 sq. m. See articles on individual cos. for pop. and topography.

Ulster Constabulary, Royal, see **ROYAL ULSTER CONSTABULARY**.

Ulster King of Arms, The office of U. K. of A., which was formerly located in Dublin Castle, and the holder of which had jurisdiction over all Irish arms, as Principal Herald, was, in 1943, after the death of Sir Neville Wilkinson, U. K. of A., transferred to the College of Heralds (q.v.) in London and joined to that of Norroy King of Arms, who in consequence is now styled Norroy and Ulster King of Arms. Owing to the altered constitutional status of S. Ireland at that time, the jurisdiction of U. K. of A. had then to be limited to N. Ireland. The Eire authorities retained the original records of Ulster's office, but in 1943 sent certified copies of these records to the College of Heralds. In N. Ireland U. K. of A. has all the rights and powers and privileges of his predecessors in Dublin, with control of all arms of N. Ireland, and he continues to be the prin. officer of the Order of St Patrick.

Ulster Rifles, The Royal, a regiment formed in 1881, when the 83rd and 86th Regiments were joined to become The Royal Irish Rifles. The 83rd was raised in 1793, and gained its first honours under Wellington in the Peninsula. It then saw service at the Cape, in Ceylon, and America. During the Indian mutiny it served in Central India. The 86th was originally employed as Marines, but in 1799 went to India, where it served with distinction at Bhurtpore (1805). During the Indian mutiny it served in Central India, and later at the Cape. The R.I.R. went through the S. African War, 1899-1902. During the First World War it raised 21 battalions, which served in France, Flanders, Macedonia, Gallipoli, and Palestine. In 1922 its title was altered from The Royal Irish Rifles to The Royal Ulster Rifles. In the Second World War the R.U.R. fought in France in 1940, the Middle E., Burma, N. Africa, Sicily, Italy, and NW. Europe.

Ulster Transport Authority, a body estab. under the Transport Act (N. Ireland), 1948, of the Parliament of N. Ireland for the purpose of integrating road and railway services and putting

transport on an economic footing. The Minister of Commerce for N. Ireland appoints the members and designates the Chairman. When the Authority began business on 1 Oct. 1948 it had vested in it the passenger and freight services of the N. Ireland Road Transport Board and the railway and hotel undertaking of the Belfast and Co. Down Railway Company. The railway and hotels of the N. Cos. Committee, purchased from the British Transport Commission, were vested in the Authority on 1 April 1949.

open to traffic. Rail-freight services are at present operated over 185 route m., and in 1954 a total of 501,153 tons of merchandise and 208,896 head of livestock were carried.

During the past few years services have been withdrawn from 140 route m. of railway which were not paying their way, including the 14 m. of narrow-gauge line between Londonderry and Strabane, which was closed in 1954. The line between Belfast and Bangor is believed to be the first section of railway in the



Central News

TREATMENT OF CHILDREN BY ULTRA-VIOLET LIGHT IN A SPECIAL CLINIC

The U. T. A. operates the public road-passenger and freight services throughout N. Ireland, with the exception of Belfast passenger transport, local operators carrying in Belfast and Londonderry, omnibus services in part of Co. Fermanagh, and certain ancillary haulage, mainly of specialised types. The U. T. A. owns and operates 185 m. of the railway system of N. Ireland, the balance being that part of the cross-border system of the Great N. Railway Board, which still operates as a separate entity.

The U. T. A. uses over 900 buses in providing services throughout N. Ireland, and in the road transport of merchandise and livestock nearly 800 motor lorries of various types are employed. Passenger-train services are provided over 138 route m. out of 185 m. of the Authority's system

U.K. to be completely changed over from steam to diesel traction for passenger traffic.

Construction and servicing of road and rail vehicles is carried on in the U. T. A.'s centralised workshops at Belfast, believed to be the first to be specifically designed for road and rail engineering work. The works extend over 15 ac., on which buildings covering 5½ ac. have been erected. *See also* CORAS IOMPAIR ÉIREANN; GREAT NORTHERN RAILWAY.

Ultra-short Waves, *see* FREQUENCY.

Ultra-violet Light, invisible to the naked eye, but rendered perceptible by the fluorescence it causes when allowed to fall upon a screen coated with certain substances (e.g. impure calcium sulphide, barium platino-cyanide, anthracene), consists of light waves of shorter wave-

length than those of the visible violet. They range from about 4000 to 2000 Angström units (i.e. 4×10^{-4} to 2×10^{-4} cm.) The fluorescent effect is used in modern 'strip' lighting. U. L. is employed in special microscopes, which require the use of quartz lenses; owing to its short wavelength, better definition is obtained than with ordinary visible light. *Infra-red light* has longer waves than the visible red part of the spectrum. It is utilised for therapeutic purposes and also in photography. (See also SUNLIGHT TREATMENT.) Physiologically U. L. is extremely powerful, producing sunburn and causing the formation of the anti-rachitic vitamin D. U. L. waves are strongly germicidal and, employed under suitable precautions, are very valuable therapeutically. They reach the earth in quantity from the sun, though much U. L. is cut off by a stratum of ozone in the upper atmosphere; and they may be produced artificially by mercury-vapour lamps and arc lamps. Treatment of children suffering from rickets by exposing them to U. L. has proved strikingly successful, while to the healthy person U. L. may act as a general tonic.

Ultra-violet Microscope, see under MICROSCOPE AND MICROSCOPY.

Ultra-violet Spectrum, see SPECTRUM AND SPECTROSCOPE.

Ultra Vires (Lat. 'beyond one's strength or power'), legal phrase used particularly with regard to the limitation of the legal or constitutional powers of a person, court, company, or corporation. In company law anything done by a company outside the powers given in the Memorandum of Association (see COMPANY) is U. V. and void; nor can the company make it valid, even if every member assents to it, because the rule is framed for the protection of future shareholders and the public at large who may have dealings with the company. Acts, however, beyond the powers of the *directors* only may be ratified by the shareholders; and acts U. V. the *Articles of Association* can be indirectly cured by simply altering the articles in the proper manner.

Ultramarine, name given to a substance of a fine blue colour, originally obtained by grinding lapis lazuli. It is now prepared artificially by heating Glauber's salt or soda with kaolin, charcoal, and sulphur, at first with exclusion of air. The dull green product is converted into the blue compound by heating with sulphur with access of air. The U. is made ready for use by washing and levigating. It is stable to light and air, but is decomposed even by weak acids. Aluminium, silicon, sodium, and sulphur are its chief constituents, but its exact composition is not clear. It is used as a pigment by artists and for colouring papers and in laundry work.

Ultramontane ('beyond the mts.' i.e. the Alps), term applied to Italy by countries N. of the Alps and transferred to the It. party in the Rom. Catholic Church, who attach great weight to papal supremacy. See GALLICANISM.

Ultrasonics, see ECHO; SOUND.

Ulverston, urb. dist., mrkt tn. and administrative cap. of the Furness dist. of Lancs, England. Industries include factories for the manuf. of medicinal antibiotic compounds, electrical accessories, light engineering, leather tanning, joinery, and clothing. U. is a holiday centre for Furness and the S. Lake Dist., and stands in an agric. area. Pop. 10,260.

Ulverstone, tn on the NW. coast of Tasmania, 76 m. from Launceston. U. is the centre of mixed farming country, a timber area, and also has expanding industries. Pop. 5000.

Ul'yanovsk: 1. Oblast in the E. of European Russia, traversed by the Middle Volga, and situated largely on the Volga upland of the r. b. There are wheat, sunflower, and potato growing, mrkt gardening, cattle breeding, and food, engineering, timber, and textile industries. Until the Russian colonisation the area was populated by the Mordva and the Chuvash peoples (qq.v.). Area 14,400 sq. m.; pop. (1956) 1,126,000, mostly Russians (since 16th cent.).

2. (until 1924 Simbirsk). Cap. and econ. centre of the above, on the Volga. It has engineering (automobiles, machine tools) and food industries. It is an important transportation centre (4 railway lines, riv. port), and also a local cultural centre. U. was founded in 1648 as a fort. tn and starting point of the Muscovite Simbirsk defence line. It has been a prov. cap. since 1780. It is the bp. of Lenin (Ul'yanov). Pop. (1956) 183,000 (1920, 77,000; 1923, 68,000; 1934, 74,000; 1939, 102,000).

Ulysses, Ulyxes, Ulixes (Gk *Odysseus*), hero of Homer's *Odyssey*, the son of Laertes (or, in later tradition, of Sisyphus) and Anticleia. He was King of Ithaca, husband of Penelope, and father of Telemachus. Homer makes him the model of a prudent warrior, acute, and always quick to devise means of avoiding or escaping difficulties, superior to all men in intelligence, in wisdom equal to the gods themselves, and in adversity courageous. Later poets sometimes represent him as cunning, and false. During the Trojan war he played the part of a gallant warrior and a bold and cunning spy. Some say he devised the stratagem of the wooden horse. The *Odyssey* tells of his 10 years' wandering after the fall of Troy. See M. P. Nilsson, *Mycenean Origins of Greek Mythology*, 1932.

Uma, or Parvati, in Hindu mythology, the consort of Shiva.

Umbelliferae, important and widespread family of Dicotyledons, contains about 1600 species. The flowers are characterised by their 5 free sepals and petals (often minute), 5 free stamens, and the inferior bilocular ovary formed from 2 carpels. The stalks of the flowers all spring from the top of the main stalk, so as generally to produce a flat flower-head, the 'umbel.' Important genera are *Aegopodium*, *Apium*, *Carum*, *Chaerophyllum*, *Coriandrum*, *Daucus*, *Eryngium*, *Ferula*, *Foeniculum*, *Melum*, *Myrrhis*, *Pseudanum*, *Stium*, etc.

Umbro, natural pigment, containing hydrated oxides of iron and manganese. The earthy pigment is washed and dried at 212° F. It then constitutes 'raw umbro,' which, calcined, becomes a rich brown colour—'burnt umbro.'

Umberto I., Ranieri Carlo Emanuele Giovanni Maria Ferdinando Eugenio (1844-1900), King of Italy (1878-1900), eldest son of Victor Emmanuel I. b. Turin. He succeeded his father as U. I, having previously married his cousin, Margherita Teresa Giovanna, princess of Savoy and daughter of the Duke of Genoa. His reign was generally uneventful. He had the reputation of being a fine soldier, and won popularity by his generosity and by his obvious interest in his people, who called him 'U. the Good.' Two unsuccessful attempts were made on his life, 1878 and 1879, but a third, by an anarchist named Bresci, at Monza, proved fatal. See E. Pedrotti, *Vita e regno di Umberto*, 1901.

Umberto II (1904-), King of Italy May-June 1946, son of Victor Emmanuel III, educ. at the military academy, Turin. He married Princess Marie José of Belgium in 1930. He was proclaimed king on the abdication of his father, May 1946, but a referendum in favour of a rep. the following month led to his retirement to Portugal, where he has since lived.

Umbilical Cord, see FOETUS.

Umbra, in astronomy means either: (a) the darkest portion of the shadow-cone cast by the earth or moon in an eclipse; or (b) the dark central part of a sun-spot.

Umbrella (Lat. *umbra*, shade), portable protection from the sun or rain, is of great antiquity. Its use was known in China as early as the 11th cent. BC, and ancient sculptures of it have been discovered in Nineveh, Persepolis, and Thebes (Egypt). In the E. the U. was an emblem of rank. In ancient Greece and Rome U.s were regarded as effeminate and seldom used by men, but in the 12th cent. the Doge of Venice had an U. with the ceremonial significance of a canopy. In Eng. literature reference is made to the U. by Dryden (1620), Swift (*City Shower*, 1710), and Gay (*Trivia*, 1716). In the reign of Anne it was used only by women, the first man to carry it being Jonas Hanway (q.v.), the philanthropist. U.s with steel ribs, instead of the hitherto cumbersome cane, were first made about 1840. The manuf. of U.s is chiefly carried on in London, Glasgow, Manchester, Paris, and Lyons.

Umbrella Bird, or *Cephalopterus ornatus*, species of Cotingidae, which is peculiar on account of a large umbrella-shaped crest on its head. The bird itself is of a uniform black plumage.

Umbrella Plant, alternative name for *Cyperus* (q.v.), also a name for *Peltiphyllum peltatum*, a perennial waterside plant of the Saxifrage family.

Umbrella Tree, name given for an obvious reason to many plants, notably to *Magnolia fraseri*, *Paritum guineense*, and a species of acacia.

Umbria, region (*compartimento*) of central Italy, comprising the provs. of

Perugia and Terni (q.v.). It is bounded NW. by Tuscany, S. by Lazio, and NE. and E. by the Marches (q.v.). Anct U. lay between Etruria on the W., the ter. of the Sabines on the S., Picenum on the E., and Gallia on the N. (q.v.). The Umbrians joined first with Etruria, and later with Etruria and Samnium (q.v.) against Rome, but became allies of Rome after 295 BC. The region has lignite deposits, and has steel and chemical industries. There are hydro-electric plants. The chief tn is Perugia. Area 3282 sq. m.; pop. 814,000.

Umbrian Dialect, see LATIN LANGUAGE AND LITERATURE.

Umbriel, satellite of Uranus (q.v.).

Umiak, Eskimo boat, resembling the kayak (q.v.) but of greater size and capacity.

Umlaut (from Ger.) has 2 meanings: (1) internal vowel change (as in Ger. *Hand* into *Hände*), usually caused by a vowel in the following syllable. It is common in Germanic languages, and traces of it remain in Eng., *mān*, *mēn*; *mouse*, *mice*, etc. (2) The diacritic mark placed over a vowel to indicate such change: *a-ä*, *u-ü*, *o-ö*. This diacritic mark is often replaced in Eng. by an *e* (*ae* = *a*, *ue* = *u*, *oe* = *o*).

Umpire, see ARBITRATION; CRICKET.

Umtali, dist. and township of the E. border of S. Rhodesia. The dist. is nearly 3700 ft above sea-level and lies about 170 m. SE. of Salisbury and 200 m. NW. of Beira. The dist. of U. is no longer an important gold-producing area, but in ancient times it most certainly was. The most productive mine in modern times, in the Penhalonga Mts, has been closed down. U. is becoming industrialised, and its fertile soil is well suited to citrus fruit, soft woods, and wattle. It is considered the most beautiful part of S. Rhodesia. U. is the gate of S. Rhodesia. The pop. of U. township is 7000 Europeans, and 18,000 Africans.

Una, see SAVA.

Unalaska, see ALEUTIAN ISLANDS.

Unamuno, Miguel de (1864-1936), Sp. novelist and philosopher, b. Bilbao of Basque descent. He studied at the univ. of Madrid, and in 1891 became prof. of Gk at the univ. of Salamanca, and later rector. In 1897 he pub. his novel, *Paz en la Guerra*, and the following year *Amor y Pedagogia*. Vols. of essays on Sp. life and traditions appeared in the next few years, and their revolutionary nature compelled him to resign his rectorship of the univ. He continued to teach there, however, and to these years belong his outstanding works of fiction, *Niebla*, 1914, and *Tres novelas ejemplares y un prologo*, 1920. He also composed verse, his most famous poem being *El Cristo de Velazquez*, 1920. But it is for his essays and philosophical book that U. is best remembered. The purpose of most of U.'s writings was to reconsider the foundations of belief and conduct and to make men open themselves to new ways of thought. His originality lies in showing how doubt and spiritual uncertainty can become a source of energy. His greatest work was *Del*

sentimiento tragico de la vida, 1913, which foreshadows Existentialism, and is one of the profoundest books of its kind written in Spanish. See study (with bibliography) by M. Romero Navarro, 1928; E. Brenes, *The Tragic Sense of Life in Miguel de Unamuno*, 1931; J. B. Trend, *Unamuno*, 1951.

Unanimism, a minor movement in Fr. literature which took place about the turn of the 19th and 20th cents. Its beginnings were in the writings of *le groupe de l'Abbaye*, a number of young poets including Georges Duhamel (q.v.), Chénivière, and Vildrac. This group is described in Duhamel's *Pasquier* novels; another member, Jules Romains (q.v.) was the leading force of the Unanimist movement. Even he left it far behind when his true poetic spirit produced *L'Ode genevoise* and *L'Homme blanc*.

Uncertainty Principle, see INDETERMINANCY.

Uncials, see PALAEOGRAPHY.

Uncinariasis, see ANKYLOSTOMIASIS.

Uncle Sam, the U.S.A. or rather the gov. of the States personified. The earliest recorded use of the nickname was in the *Troy Post* (7 Sept. 1813), where it is said to be derived from the initials 'U.S.' on gov. wagons during the war of 1812. A similar but earlier origin is given by some writers who mention one Samuel Wilson, inspector of Elbert Anderson's store on the Hudson R. in the days of the Amer. War of Independence. The goods bore the contractor's initials, being marked E.A.—U.S. and the latter were jocularly read by the workmen as 'Uncle Sam.' Whichever be the true origin, the nickname began to appear after 1813 in New York newspapers. The earliest use of the name in a book was in *The Adventures of Uncle Sam*, 1816, by 'Frederick Augustus Fiddady, Esq.', and some years later it was used in W. Faux's *Memorable Days in America*. Just before the Civil war it had found its way into dictionaries as the accepted sobriquet of the nation. The familiar costume of U.S. was taken from that of 'Major Jack Downing,' whom he superseded as the cartoonists' national symbol.

Unconformity. Where an overlying series of rocks rests upon the eroded edges of an older series, usually having a different dip, the beds are said to be unconformable, and the appearance is termed U.

Unconsciousness. While sleep may be regarded as an example of U., the latter term, in its usually accepted meaning, is reserved for conditions such as coma (q.v.), in which there is complete loss of consciousness. There is no voluntary movement of any kind, and the patient cannot be roused by shaking or calling or by any external or internal stimulus. Whereas sleep is a normal habitual phenomenon essential to health, the term U., in its usual application, implies an abnormal or pathological state. The depth and duration of a state of U. (which, incidentally, constitutes a prognostic index of some value) will vary with the cause, from a transient attack, such as occurs in syn-

cope or an epileptic fit, to the deep and prolonged forms associated with grave conditions like cerebral haemorrhage, profound toxæmia, or the destruction of brain tissue due to violence. The precipitating cause of U. is a disturbance of the cerebral circulation, and this, in turn, may be traumatic, toxic, or inflammatory in origin. The distribution of the accompanying signs and symptoms is of great value in diagnosing and localising the cause. Thus where the symptoms are unilateral and asymmetrical, the cause may be cerebral haemorrhage, embolism or thrombosis, cerebral tumour or abscess, or cerebral compression due to extra-cerebral haemorrhage. Where they are bilateral and symmetrical, on the other hand, the causative condition may be concussion, sub-arachnoid haemorrhage, post-epileptic coma, uræmia, diabetes mellitus, insulin hypoglycaemia, poisoning by opium, alcohol, barbiturates, etc., meningitis, acute encephalitis, encephalitis lethargica, cholaemia, cerebral malaria, heat-stroke, the terminal coma of typhoid, typhus, cholera or cancer, or anaphylactic coma, etc. See also STUPOR.

Unction, see EXTREME UNCTION.

Undercliff, The, succession of cliffs and terraces sloping towards the sea on the S. coast of the Is. of Wight, England, and extending from Dunnose past Ventnor to Blackgang Chine, which seem to have been formed by landslips. The dist. extends for about 7 m., and is from $\frac{1}{2}$ to $\frac{1}{4}$ m. in width.

Underground Dwellings, see SOUTHERN RAINS.

Underground Movements, see GUERRILLAS; RESISTANCE MOVEMENTS.

Underground Railroad, secret system formed in the N. States of America before the Civil war in order to assist fugitive slaves to reach Canada, where they were safe from recapture. Guidance, shelter, food, and clothing were provided by the sympathisers.

Underground Railways of London. The Underground Electric Railway Company of London, Ltd., was registered in 1902, when it absorbed the Metropolitan Dist. Electric Traction Company (registered in 1901 to electrify the Metropolitan Dist. Railway). The company constructed the Charing Cross, Euston and Hampstead, Great Northern, Piccadilly and Brompton, and Baker Street and Waterloo Railways, which were all amalgamated as from July 1910 as the London Electric Railway Company. In 1912 the company acquired control of the London General Omnibus Company, and in 1913 the City and South London Railway Company and the Central London Railway Company. Under an Act of 1915 the City and South London, Central London, London Electric, and Metropolitan District Railway Companies and the London General Omnibus Company, in all of which the Underground Electric Railway Company was largely interested, entered into a pooling agreement. In 1928 was acquired control of the London and Suburban Traction Group. In 1933 the whole group of underground railways, together with the

L.G.O.C. and Tramways Companies, were transferred to the London Passenger Transport Board, estab. to provide a co-ordinated system of passenger transport for the London Transport area as defined in the Act creating the Board. Under the Transport Act, 1917, on 1 Jan. 1948, the undertaking was vested in the British Transport Commission (q.v.), and thenceforth the functions of the former London Passenger Transport Board were transferred to the London Transport Executive (q.v.) as agent of the Commission. See PARIS METRO; ROMK; MOSCOW; RAILWAYS.

Underhill, Evelyn (1875-1941), Brit. poetess and mystic. She was educ. at King's College for Women, London, of which she became a Fellow, and in 1907 she married Herbert S. Moore. In 1921 she was appointed lecturer on the philosophy of religion at Manchester College, Oxford. Her works include *Mysticism*, 1911, *The Mystic Way*, 1913, *Practical Mysticism*, 1914, *The Essentials of Mysticism*, 1920, *The Life of the Spirit*, 1922, *Man and the Supernatural*, 1927, *The House of the Soul*, 1929, and *The Golden Sequence*, 1932. Her *Letters* were pub. in 1943.

Underpinning, see SHORING.

Undersea Archaeology, see ARCHAEOLOGY, *Undersea Archaeology*.

Under-sheriff, see SHERIFF; LOCAL GOVERNMENT.

Understanding, in philosophy, a term used in 2 somewhat different senses. By the older Eng. philosophical writers, such as Locke and Hume, it is used to denote the human mind in general and the human intellect in particular, in opposition to the faculties of emotion and volition. It is now more used in the sense given it by Kant and developed by Hegel. In this sense U. is the lower faculty of the mind which deals with phenomena, while reason is the higher faculty dealing with noumena or universals.

Underwriter, see INSURANCE.

Undeveloped Land Duty, see LAND TAXES.

Undines, name given in the system of the Paracelsists to the elementary spirits of the water. They are of the female sex. Among all the different orders of elemental spirits they intermarry most readily with human beings, and the Undine who gives birth to a child under such a union receives with her babe a human soul. But the man who takes an Undine to wife must be careful not to go on the water with her, or at least not to anger her while there, for in that case she will return to her original element.

Undset, Sigrid (1882-1949), Norwegian novelist, b. Kalundborg, Denmark. She was educ. at Christiania (Oslo) Mercantile College, but her father's death forced her to take up clerical work at the age of 16. Her first success was with the novel *Jenny*, 1912, Eng. trans. 1927, in which she wrote as the champion of family life against the dull, cheerless existence of a business career. She did not write in the style of her time, which treated 'art' and 'love' as separate concepts from house

and home, but advocated a natural and social love between man and woman. She became a Rom. Catholic after the First World War, and wrote a remarkable trilogy of historical novels, *Kristin Lavransdatter*, 1920-2, Eng. trans., 1923-7. She received the Nobel Prize for literature in 1928. Other novels trans. into Eng. are *The Cross*, 1927, *The Ase*, 1928, *The Snake Pit*, 1929, *The Son Avenger*, 1930, *The Wild Orchid*, 1931, *Ida Elisabeth*, 1933, *Gunnar's Daughter*, 1936, *Images in a Mirror*, 1938, and *Madame Dorothea*, 1941. See A. Gustafson, *Sir Scandinavian Novelists*, 1940; N. R. Anker *Min venn S. Undset*, 1946.



Royal Norwegian Embassy

SIGRID UNDSET

Undue Influence. In law a contract to which a party has been induced to give his consent by the exercise of U. I. on the part of another is voidable. So also a will can be attacked by interested parties on the same ground. Presumptions of U. I. arise generally in connection with gifts. It is entirely a question of fact whether in any particular case U. I. was used. The law will not presume U. I. until it is first proved that the relationship between the parties was or is such that one of them was likely to be able to exercise his influence over the other, and then it is open to the defendant to rebut the inference from such relationship. The relations of solicitor and client, parent and child, guardian and ward, trustee and beneficiary are all presumed to give the former in each case influence over the latter. But the strength of the presumption depends entirely on the intimacy of the relationship, e.g. that of a doctor and his patient is in most cases not

nearly so close as that of a guardian and ward. U. I. is not in any way a doctrine specially connected with defective will-power, though such fact, if present, may be a strong element for the consideration of judge or jury.

Undulant Fever, see MALTA FEVER.

Undulatory Theory, see INTERFERENCE; LIGHT; OPTICS; SOUND; WAVE.

Unemployment, term applied technically to the condition of those willing and able to work for wages and registered for employment in industry but unable to secure either full or partial employment. A state of 'full employment' does not, however, mean that there is no U. If the number of vacant jobs is greater than the number of unemployed persons, U. at any one time will be due to the interim period while the individual is passing from one job to another. Even if the number of unemployed at times slightly exceeds the number of vacant jobs, there may still be a state of full employment. U. in such conditions being seasonal or frictional but hardly at all structural. Frictional U. is simply the result of temporary readjustments between the labour supply and demand, and may be met by increasing the mobility of workers or by ensuring that the workers available to industry in any one place have the qualifications required. Such frictional U. is unavoidable, and indeed desirable, in a dynamic progressive economy in which new methods of production and even whole industries are continually replacing old ones. Structural U., on the other hand, is more fundamental. U. is due to the demands on an industry slackening so that the economic life of the locality in which the industry is situated appears to be permanently affected. Lord Beveridge considered that a state of 'full employment' could be said to have been reached when 3 per cent of the working population was not at work (i.e., in the labour market after the Second World War, about 750,000).

From the reign of Queen Elizabeth I, when the vagrant or vagabond class had increased so as to require legislative attention, the only remedy the State had to offer was the Poor Law system, and in extending outdoor relief the policy of the Poor Law ignored all distinctions between the destitute through trade depression and the congenital loafer or 'unemployable.' The recognition of the differences between the class of unemployed who are of good character and can show good industrial records, the aged, infirm, or inefficient unemployed, and the morally defective unemployed, has at least resulted in an endeavour to meet these different classes with different remedies. (See EMPLOYMENT EXCHANGES; LABOUR COLONIES; NATIONAL INSURANCE ACT.)

During the period between the two World Wars, U. assumed the importance of an acute world-problem. The chief causes were: (1) disorganisation of the labour market; (2) a surplus of available labour, together with a surplus of manufactured goods; and (3) under-consumption. Other contributory causes include

excessive wages. Tariffs, too, are theoretically a potential cause of U. where they lead to restricted markets, though in Britain a large section of the pop. in the 1930s came to believe that Britain's continuance of free trade when other countries had adopted protection was making her a dumping ground for cheap foreign goods, and thereby causing vast U. among British workers.

In the U.K. industrial depression began to cause U. soon after the end of the First World War, and by 1921 the number of unemployed had risen from about 700,000 to over 2,000,000 (excluding those idle through industrial disputes). The number continued above the million mark, but during the twenties was confined mainly to the coal trade and to a limited number of other industries dependent on overseas markets in which there was a decreasing demand for Brit. goods. The General Election of 1929 was largely fought on the U. issue, and resulted in a Labour victory, due to the hope of increased employment and a more generous administration of the U. Insurance Acts, which had hitherto debarred from benefit any classified as 'not genuinely seeking work.' The economic depression of 1931 followed, and by 1932, U. had reached its highest total with 2,847,000 or 22 per cent of the insured working pop. Legislation during the thirties was aimed at developing new industries in what came to be known as the 'special' or 'development' areas, where U. was heaviest. The problem persisted, however, until 1939, when with the coming of war it ceased.

The total working pop. available for civilian employment in Great Britain was 19,750,000 in June 1939 (14,656,000 men and 5,094,000 women). In June 1948 and June 1949 it was over 23,000,000, and continued at this figure into the 1950s, including approximately 16,000,000 men and 7,000,000 women.

U. in the U.S.A. Workers are insured under State U. insurance laws, which require contributions from employers at statutory rates. Employers are also taxed under the Federal U. Tax Act, which assesses the rates in accordance with the amounts contributed under State laws.

During the 10 years 1930-9 the average number of unemployed was 8,500,000 out of a total working pop. of over 51,000,000. The post-war working pop. has increased to over 60,000,000, and the number of unemployed declined to 2,000,000-3,000,000 until the recession of 1958, when it rose to over 5,000,000.

See B. S. Rowntree and B. Lasker, *Unemployment: A Social Study*, 1911; J. M. Keynes, *General Theory of Employment, Interest, and Money*, 1936; W. H. Beveridge, *Unemployment, A Problem for Industry*, 1930, and *Full Employment in a Free Society*, 1944.

Unemployment Benefit, see NATIONAL INSURANCE ACT.

U.N.E.S.C.O. (United Nations Educational, Scientific, and Cultural Organisation). The purpose of this organisation, which now includes over 70 member states according to its Constitution (16 Nov.

1945) is 'to contribute to peace and security by promoting collaboration among the nations through education, science, and culture in order to further universal respect for justice, for the rule of law, and for the human rights and fundamental freedoms which are affirmed for the peoples of the world, without distinction of race, sex, language, or religion, by the Charter of the United Nations.'

U.N.E.S.C.O. came into operation in Nov. 1946. Commissions were estab. to cover the following subjects amongst others: economics and employment; transport and communications; statistics; human rights; social studies; the status of women; narcotic drugs; population; and aid to war-devastated countries. One of U.N.E.S.C.O.'s duties would seem to be to conduct preliminary investigations of such problems which the member nations must solve for themselves. See J. Huxley, *U.N.E.S.C.O.: Its Purpose and its Philosophy*, 1946.

Unfunded Debt, see PUBLIC DEBT.

Ungaretti, Giuseppe (1888-), It. poet, b. Alexandria. He studied in Paris, where he was influenced by the work of Mallarmé and Valéry. U. became the chief exponent of the *poesia pura*; he believed that the poet's aim should be to convey an immediate impression by means of words and sounds. This type of poetry is necessarily obscure in its symbolism and imagery; it is a poetry for the few. U.'s theories had a great influence on younger poets in the second quarter of the cent. Among his works are *Il porto sepolto*, 1916, *Le guerre*, 1919, *Sentimento del tempo*, 1933, *Il dolore*, 1947. See F. Flora, *La poesia ermetica*, 1938.

Ungava, former dist. of Labrador, Canada, occupying all the interior of the peninsula now known as the Territory of U. It was annexed to Quebec in 1912 under the Quebec Boundaries Extension Act. Area 351,780 sq. m. It contains numerous lakes and is watered by many small rivs. Fort Chimo is the chief port. Furs are obtained, and iron, lead, copper, and other minerals are found. The working of the rich iron-ore fields of U. by the Iron Ore Company was the outstanding event in the Prov. of Quebec's mining industry in 1954. This development, which necessitated an initial expenditure of \$250m., is the largest undertaken in the hist. of Canadian mining. A 360-m. railroad, linking Seven Islands on the St Lawrence R. with Knob Lake, was inaugurated in July 1954, when the first shipment of iron ore was made. The search for new iron-ore deposits on mining property is still going on in U. According to reports supplied by the companies concerned, proven deposits in U. were estimated at over 418,000,000 tons of ore grading more than 59 per cent iron.

Unguent, see OINTMENT.

Ungulata, terrestrial, mainly herbivorous mammals with the terminal phalanges generally invested with horny hoofs. The old mammalian order is now split up into separate orders: Artiodactyla, even-toed, hoofed mammals; Perissodactyla, odd-toed, hoofed mam-

mals (*Ungulata vera*); Proboscidea, elephants; and Hyracoidea, *Hyrax*.

Ungvár, see UZHGOROD.

Uni (Unni, Unno, or Huno), St (d. 936). Benedictine of New Corbie, Saxony, became Bishop of Bremen-Hamburg in 917. He was successful in the evangelisation of Denmark and Sweden. His feast is on 17 Sept.

Uniat, oriental Christian in communion with Rome. U.s keep their own liturgy and anct rites, with married priests and communion in both kinds. See MARONITES; MELCHITES; NESTORIAN CHURCHES.

Unicorn, fabulous Indian animal, referred to by Gk and Lat. writers, resembling a horse and having one straight horn 1½ cubits long on its forehead. The U. was later confused with the rhinoceros. The A.V. uses the word (see Deut. xxxiii. 17) as a trans. of 'wild ox.' The figure is used in heraldry. The horn of the sperm whale may have originated the idea. See O. Shepard, *The Lore of the Unicorn*, 1930.

Uniflow Engines, see STEAM ENGINES.

Uniform (Military). *Army*. Military U.s were first introduced into England by the Tudor kings, whose first political act on attaining the throne was the abolition of the feudal armies which had fought the wars of the Roses. These retainers of great lords were distinguished not so much by their whole dress as by the badges of their employers. The legislation of Henry VII restricted the wearing of livery to domestic servants, and specifically forbade the wearing of badges. This prohibition remained under Henry VIII, who formed the Yeomen of the Guard, whose U. is the oldest extant in England.

Until the end of the 17th cent. the army was clothed either as household troops (at first only the Yeomen of the Guard), whose U. was wholly or partly red, or as line regiments raised by officers under royal licence. The latter were both clothed and paid by the officer who raised the regiment, and thus clothing was usually uniform within a regiment (the cloth having been bought in bulk by the colonel or his agent), but there was no uniformity outside these limits. At the outbreak of the Civil war neither side had uniformity of dress, and this led to considerable confusion in the earlier engagements. When the Parl. forces were reorganised in the New Model in 1645 all regiments composing it were clothed in red. This colour was subsequently adopted for the Commonwealth forces as a whole, and continued in use after the Restoration. During the later Stuart and early Hanoverian reigns an attempt was made to reduce the diversity of clothing details to a system, and by 1756 there was a generic type of U. common to all units of an army: all infantry were in general dressed alike, with different facings for each regiment, and distinctive articles of dress for grenadiers and fusiliers.

Regional costume has played some part in the design of U.s, for instance in the kilts and hose of the Highland regiments and in the latter-day caubeen and green plume of Irish regiments. But items of

foreign uniform have been adopted either because new arms have been introduced from abroad or because the military prestige of a certain power has induced others to imitate its U. Thus the full-dress (which is the 19th-cent. active service dress) of lancers and hussars is of Polish and Hungarian origin respectively, and the 'rifle green' of Brit. rifle and light infantry regiments was copied from the *Jäger* regiments of various Ger. principalities.

The beret, which by 1945 had become almost universal in the Brit. Army, was borrowed from the Fr. *Chasseurs Alpins*, and the forage cap which preceded it had a wide vogue on the continent, being ultimately of Austrian origin. This is an example of imitating a defeated power which was followed in 1949 by the tentative introduction into the Brit. Army of an active-service dress which included a greatcoat of distinctly German cut and a variety of the Ger. *Einheitsmütze*, a peaked cap originally worn by the Austrian *Kaiserjäger*, then by Ger. mt troops, then by the *Afrika Korps*, and finally by all Ger. infantry.

Since 1900, when protective colouring was adopted on a large scale as a result of experience in S. Africa, considerations of utility have predominated; all armies have introduced a 'drab' fighting garb, and as arms and equipment become ever more expensive, there has been a tendency to save money by discarding parade dress. Where it has been retained it has become increasingly archaic, because for the same reasons of economy the field service dress of yesterday becomes the last word in utility as opposed to smartness, and has become a 'walking-out' U., and in a modified form has long been used for ceremonial parades, with its severely practical belt, once designed as the main support of 'fighting order' equipment, now stripped of its webbing shoulder straps and pipe-clayed and burnished into an article of pure adornment. In recent years a No. 1 dress has been adopted for the Army and is increasingly seen. It is of dark blue (the scarlet of the past 3 cents. has been abandoned except in the case of Guards), and the facings are those traditionally associated with the various regiments.

For illustrations of badges of rank and appointments in the Brit. Army, see ARMY.

See also RANK.

See *A Representative of the Clothing of . . . all the Forces upon the Establishment of Great Britain and Ireland, 1742*; W. Richards, *Her Majesty's Army, 1888*; C. C. P. Lawson, *A History of the Uniforms of the British Army to 1760, 1939-41*; R. M. Barnes, *History of the Regiments and Uniforms of the British Army, 1950*.

Navy. Throughout the Middle Ages seamen wore ordinary clothing, but in the reign of Richard II (1385) a sea gown was worn, and this lasted until the days of the Stuarts. During the Tudor period the colours were green and white, changed in the reign of Charles I to red and yellow. They so remained for officers until the

estab. of a proper naval U. in 1748, for which George II decided that the colours of the Duchess of Bedford's riding habit (blue faced with white) should be adopted. Meanwhile, a certain uniformity in seamen's attire had begun in 1628, due to the issue of 'slop' clothing on repayment. It was for long the custom of captains to dress their boats' crews and even ship's companies in special rigs. U. proper was not introduced for ratings, until 1857, and consisted of the blue cloth jacket and trousers, from which has developed their rig to-day. The sailor collar dates its origin from the time when sailors wore 'pig-tails,' and prevented the latter from soiling their uniform. The change in officers' U. followed that of contemporary fashion, the present monkey jacket replacing the blue tunic in 1879. Hats were not mentioned in the regulations until 1825, when a cocked hat to be worn fore and aft was ordered. Caps were introduced in 1833. Mess-dress and undress were regularised in 1891, as well as white U. for tropical wear. Gold stripes as an indication of rank were first authorised in 1861, and in 1918 all officers were allowed what was previously the 'executive' curl to the top stripe. The purple and white stripes that formerly distinguished officers of the Engineering and Supply branches have now been abolished.

Royal Air Force. The U. is blue-grey in colour, and the 2 main types are: a best dress, known as No. 1 (Home) Dress, consisting of jacket with brass buttons and trousers, worn on ceremonial occasions and for walking out; and No. 2 (Home) Dress (formerly known as battle, or war service, dress), consisting of blouse and trousers, which is the normal working dress. In overseas commands the tropical U. of khaki drill is worn in hot seasons. Peaked caps are worn with No. 1 (Home) Dress, and a beret, which replaces the once-familiar field-service cap, with No. 2 (Home) Dress.

Royal Air Force U. (with the exception of No. 2 (Home) Dress) has remained substantially the same in design since the formation of the R.A.F. in April 1918, although until the end of the First World War it was made of army khaki cloth. Before the Second World War a full dress U. (of which a plumed cap, ornamented with black fur, somewhat similar in design to a hussar's full-dress headgear, was a conspicuous feature) was worn by officers, but this is now obsolete.

Uniformitarianism. The principle of U. was first formulated by the geologist James Hutton (q.v.). It states that the structural and petrological evolution of the earth's crust during the whole extent of geological time has been controlled by physical processes of types which are still in action to-day. The principle of U. can be summed up in the phrase 'the present is the key to the past.' It contrasts with the old catastrophic theory, which postulated the occurrence in the course of geological time of events radically different from anything going on at the present day.

Uniformity, Acts of, series of Acts passed by Parliament for the regularising of public worship in England. The Act of 1549 directed the clergy to conform to the new prayer-book of that year. The new prayer-book of 1552 was accompanied by an Act which prescribed its use by laity and clergy. The Act of 1559 imposed the Elizabethan prayer-book on the whole kingdom, and required all persons to attend their par. church. The best-known Act, however, is that of 1662. This required the revised Liturgy of that year to be used in all churches and places of worship.

Union, see TOKELAU.

Union, or Workhouse, see POOR LAWS.

Union, Irish. The U. of Great Britain and Ireland was effected on 1 Jan. 1801 after being rejected by the Irish Commons the previous year by only one vote. The 'bigoted fury of Irish Protestants,' the attitude of the Irish Parliament during the disputes over the regency, and the fact that it was only by 'hard bribery' that the Eng. Gov. could secure their co-operation in the simplest measures of administration, all conspired to convince Pitt at the end of the 18th cent. of the absolute political necessity for U. The Irish Parliament, whose members all belonged to the Church of Ireland, passed the Bill after a liberal distribution of peerages and pensions had been made to its members. Moreover, Pitt had promised to link this measure with one of Catholic Emancipation (q.v.).

But George III refused to sanction Catholic Emancipation. The Irish Catholics therefore came to regard the Act of Union as yet another example of Eng. perfidy—and the circumstances of its passage into law considerably strengthened the bond between Irish separatism and Catholicism. The Act provided that 100 Irish members should become part of the House of Commons at Westminster, and 28 temporal with 4 spiritual peers, co-opted for each Parliament by their fellow peers, should represent Ireland in the House of Lords. Commerce between the two countries was to be free from all restrictions, and the trading privileges of each were to be freely extended to the other, while there was to be a proportional distribution of the burden of taxation between the two nations.

The U. was dissolved in 1921, when the agreement setting up the Irish Free State (q.v.) was concluded. *See* IRELAND, *History*.

Unión, La, see LA UNIÓN.

Union Bank of Scotland Limited, The, was founded in Glasgow in 1830 under the title of The Glasgow Union Banking Company with a paid-up capital of £400,000. A vigorous policy of expansion was pursued from the outset, and by 1843 the bank had absorbed the majority of Scotland's prin. private banks. In 1843 the title of The Union Bank of Scotland was adopted. In the same year the paid-up capital was increased to £1m., and it remained at this amount until 1930, when it was raised to the present (1949) figure of £1,200,000. The first London office was

opened in 1878 at the corner of Cornhill and Bishopsgate, and 3 other London branches have since been opened. The head offices are in St Vincent Street, Glasgow, and in George Street, Edinburgh, and there are 200 branches in Scotland.

Union-Castle Line, The. This shipping line was formed in 1900 by the amalgamation of the Union Line (founded 1853) and the Castle Line (founded 1862). In 1857 the Union Line inaugurated the Cape Mail service by the dispatch of the R.M.S. *Dane*, a vessel of 530 tons, from Southampton to Cape Town. The direct mail service was extended to Port Elizabeth in 1864; to East London in 1876; and to Durban in 1887, the mail contract having been renewed in 1863 and again in 1868. The Castle Line, founded by Donald Currie (1825-1909, knighted in 1881) in 1862, entered the S. African trade in 1872, and quickly estab. an important position in the S. African service. In 1876 the Castle Line shared the mail contract with the Union Line. The Castle Line vessels sailed from Dartmouth, but were later (1891) to embark the Cape mails at Southampton—the port of departure of the Union liners—although passengers joined the ships in London. There was very keen competition between the 2 companies. At the time of the amalgamation in 1900 both fleets were of approximately equal size, the Union Line having 19 vessels totalling 104,107 tons, and the Castle Line 20 vessels totalling 108,886 tons. In 1956 the Union-Castle Fleet consisted of 27 vessels and one under construction, aggregating well over 400,000 tons, and operating mail, passenger, and cargo services between the U.K. and S. and E. African ports, Mauritius, etc. The largest ships of the line are the *Pretoria Castle* and the *Edinburgh Castle*, both of 28,705 tons; *Capetown Castle*, 27,002 tons; *Athlone Castle*, 25,567 tons; *Stirling Castle*, 25,554 tons; *Carnarvon Castle*, 20,148 tons; and the *Winchester Castle*, 20,001 tons.

Union City, city of Hudson co., New Jersey, U.S.A., on Hudson R., opposite New York. It manufs. embroideries, silk, clothing, handbags, soap, lamps, toilet preparations, and paper products. The city was formed in 1925 by the amalgamation of the tns of Union and W. Hoboken. Pop. 55,537.

Union Group, see TOKELAU.

Union Jack, see FLAG.

'Union Jack' (newspaper), see ARMY NEWS SERVICES.

Union of Churches, a movement to reunite Christendom by bringing together various Christian denominations. It must be distinguished from the Church Union (q.v.). In the 19th cent. the disunity of Christians came to be seen as contrary to the Will of God, a stumbling block to effective missionary work, and a wasteful overlapping of Christian resources. The movement has gathered momentum in the 20th cent. Canada provides a remarkable example. Nine different unions of Presbyterian bodies were effected between 1817 and 1875, and 16 Methodist bodies united between 1820 and 1884. In

1925 the Methodists, nearly all the Congregationalists, and about two-thirds of the Presbyterians merged in the United Church of Canada. In Scotland the union of the United Free Church of Scotland and the (Presbyterian) Church of Scotland was effected in 1920. In England the Wesleyans, United Methodists, and Primitive Methodists united in 1932 to form the Methodist Church. Greater difficulties arise when attempts are made to unite bodies which differ on fundamental questions of church order, e.g. the Church of England, which holds episcopacy to be integral to the structure of the Church, and bodies which consider it to be no more than one among several possible forms of church gov. Nevertheless, the Church of England is eager to promote the U. of C. The 1920 Lambeth Conference (q.v.) issued an Appeal to All Christian People, towards this end. In 1946 the Archbishop of Canterbury (Dr. Fisher) preached a sermon suggesting that the way forward was by a process of growing together and assimilation rather than by federation or constitutional union, and asking non-episcopal churches to consider ways in which they could take episcopacy into their own systems. The interest aroused by this has led to exploratory conversations between Anglican theologians and theologians both of the Methodist Church and of the Church of Scotland (1957). Anglicans have also played a major part in the most outstanding example of re-union of the 20th cent., that of the Church of S. India, which was inaugurated in 1947, where 4 Anglican dioceses united with Presbyterian, Congregationalist, and Methodist bodies. The Church of S. India accepts the historic episcopate, its first bishops having been consecrated by Anglican bishops. Re-ordination of ministers not episcopally ordained in 1947 was not required, but since then all ordinations have been by bishops. Similar negotiations are proceeding (1956) in N. India and in Ceylon, but with the intention of unifying the whole ministry when the new churches are inaugurated. The Rom. Catholic Church has officially proved adamant on the subject of re-union. Cordiality was shown in the informal conversations at Malines in 1921 between Anglican theologians and Rom. Catholic theologians led by Cardinal Mercier; but they came to nothing, and subsequently the Pope has banned all doctrinal discussions of this kind. There seems no immediate prospect of Rome's union with any other churches except on the basis of their submission to the Papacy. See H. Martin, *A Christian Plea for Re-Union*, 1941; Vincent McNabb, *The Church and Re-Union*, 1937 (from the Rom. Catholic view-point); Lord Halifax (ed.), *The Conversations at Malines, 1921-5*, 1930; G. K. A. Bell (ed.), *Documents on Christian Unity* (4 vols.), 1920, 1930, 1948, 1958; Lambeth Conference Reports, especially those of 1920, 1930, and 1948; G. F. Fisher (Archbishop of Canterbury), *A Step Forward in Church Relations* (Cambridge Sermon), 1946.

Union of South Africa, see SOUTH AFRICA.

Union of Soviet Socialist Republics (abbr. U.S.S.R.), official name of the Russian state. It was adopted in 1922 at a congress of representatives of the 4 Soviet reps. in existence at the time—the R.S.F.S.R., the Ukraine, Belorussia, and Transcaucasia—when the U.S.S.R. was officially founded as a federal state. The name was deliberately chosen to avoid any national association, since the U.S.S.R. was meant to embrace ultimately the whole world. Two more constituent reps. were admitted in 1925, Turkmenia and Uzbekistan, formed as a result of the so-called 'national demarcation' on Central Asia in 1924. Later sev. Autonomous Reps. were raised to the status of constituent reps. of the U.S.S.R. (Tadzhik, 1929, Kazakh and Kirghiz, 1936, Karelian and Moldavian, 1940). The Baltic States (q.v.) of Estonia, Latvia, and Lithuania, annexed in 1940, were also transformed into constituent reps. of the U.S.S.R. The Karelo-Finnish Rep. was again transformed into the Karelian Autonomous Rep. in 1956. Although there are some differences in the law of individual reps., the federal structure of the U.S.S.R. is largely fictitious, because the real authority lies throughout the U.S.S.R. in the hands of the strictly centralised Communist party of the Soviet Union (q.v.). See also under RUSSIA; SOVIET, and the individual reps. See W. Kolarz, *How Russia is Ruled*, 1953; R. Pipes, *The Formation of the Soviet Union* (Harvard, Mass.), 1954; M. Fainsod, *How Russia is Ruled*, 1954.

Union Pacific Railroad. This system was chartered under an Act of Congress in 1862, when it was considered necessary to have more railways, primarily for the purposes of pursuing the Civil war. Today the system embraces 9182 m. of railway, running through 13 states. The connection of the railroad with the Central Pacific at Promontory, Utah, 50 m. W. of Ogden, in May 1869, completed this the first transcontinental railroad. In the main it covers the ter. from Council Bluffs and Kansas City in the E. to the great Pacific coast cities of Los Angeles, Portland, and Seattle, serving Denver, Cheyenne, Salt Lake City, Tacoma, and Olympia.

Unionist, see CONSERVATIVE PARTY; POLITICAL PARTIES.

Uniontown, city of Pennsylvania, U.S.A., the co. seat of Fayette co. It produces bituminous coal, coke, metal products, clothing, beverages, dairy products, lumber, and limestone. The city has a memorial to Gen. Edward Braddock on the site of his death and burial following defeat by the French and Indians (1755). Pop. 20,470.

Unit, see METROLOGY; PHYSICAL UNITS. Unit Trust, or Unit Investment Trust, a device which enables the small investor to spread his risks with relative safety. The investments are entrusted to a manager (or group of managers) whose powers and obligations are set out in a Trust Deed. The first Brit. U. T. was

formed in 1931. The movement was favoured by the steep rise in ordinary share values following the boom in gold shares in 1932-3 and thereafter. The bulk of the holdings of the U. T.s were in the ordinary shares of well-established companies, and by the end of 1938 over 80 Trusts were managing investments of about £100m. In the U.S.A. most U. T.s formed in the first years of the movement were operating on a fixed panel of a score or so equities, but later Trusts operated in wider fields.

In view of the growth of the U. T. movement in Britain, the Prevention of Fraud (Investments) Act of 1938 was passed to protect shareholders by outlawing 'share-pushing.' As in the U.S.A., Brit. Trusts, which at first were generally Fixed Trusts, have widened the scope of their investments. But the principle of spreading the risk has (usually) been maintained by limiting investment in any one company to some 5 per cent of the portfolio. After the Second World War lively interest in the U. T. did not revive till the middle 1950s. In 1954 Municipal and General Securities' 'Thrifty Plan' enabled individuals to participate not only by lump-sum investments but also by periodic (monthly or quarterly) payments. In 1956 the London and Manchester Insurance Company based its pension scheme for self-employed persons on a U. T. In 1957 a company was formed to run 2 U. T.s especially designed for pension funds, charitable funds, institutional trustees (banks, etc.). The Church and other large investors began to show interest in U. T.s, and new methods of distribution for small investors ('across the counter,' etc.) were begun.

Unitarianism. The term, in its strict and literal sense, denotes simply belief in one God, and when thus understood is a generic term applicable not only to Christianity but also to Judaism, Mohammedanism, and every form of monotheism. But it is almost invariably used as the designation of the belief held by certain Protestants who, while rejecting the scheme of orthodox theology as a whole, nevertheless acknowledge the pre-eminent position of Jesus Christ in the world's hist. as a teacher of religion and a prophet of righteousness. A modern summary of the Unitarian faith enumerates the Fatherhood of God, the Brotherhood of Man, the Leadership of Jesus, the Victory of Good, the Kingdom of God, and the Life Eternal. The Eng. Unitarians trace their descent from those congregations, mainly Presbyterian, whose ministers were ejected in 1662, many of whose chapels are now in Unitarian hands. Many Amer. Congregationalists are also Unitarian in belief. U. has continued in England under such leaders as Priestley, Martineau, Thom. Spears, Drummond, Wicksteed, Stopford Brooke, Estlin Carpenter, and through the influence of the Americans W. E. Channing and Theodore Parker. Its ministers are trained chiefly at Manchester College, Oxford, the Unitarian College, Manchester, and the Presbyterian College, Carmarthen. In 1928 was formed

the 'General Assembly of Unitarian and Free Christian Churches.' The Assembly has about 250 ministers, 325 churches and other places of worship in Great Britain and Ireland. There are some 300 churches in the U.S.A., nearly half in Massachusetts; the membership numbers 90,000. See S. A. Elliot, *Heralds of a Liberal Faith*, 1910; J. E. Carpenter, *Unitarianism: a Historic Survey*, 1923; R. M. Wilbur, *Our Unitarian Heritage*, 1926, *A History of Unitarianism: Socialism and its Antecedents* (2nd ed.), 1946, and *A History of Unitarianism in Transylvania, England and America*, 1953; R. V. Holt (ed.), *A Free Religious Faith*, 1945; W. G. Tarrant, *Story and Significance of the Unitarian Movement*, 1948; A. Hall, *Beliefs of a Unitarian*, 1948.

United Arab Republic, a state proclaimed on 1 Feb. 1958 by the presidents (Presidents Nasser and Kuwatly) of Egypt and Syria (qq.v.) uniting their countries under a presidential democratic system of gov., with the executive authority resting in the head of the state (who would have ministers responsible to him), and a unicameral legislature. On 21 Feb. a plebiscite confirmed the U. A. R. and declared Col. Nasser to be first president. In March the Yemen (q.v.) joined the U. A. R.

United Brethren in Christ. This denomination resulted from the religious awakening of Philip William Otterbein, Martin Boehm, and their collaborators, the church itself having its inception at a meeting held about 1768 near Lancaster, Pennsylvania. The church was formally organised in Frederick Co., Maryland, in 1800. In 1946 the U. B. C. merged with the Evangelical Church to form the Evangelical United Brethren Church (q.v.).

United Free Church of Scotland, Scottish Presbyterian body, formed in 1900 by the union of the United Presbyterian Church and the Free Church of Scotland (q.v.). This union was the result of a long series of negotiations prompted by a strong and general desire for reunion, but the minority of the Free Church, who had refused to join the union, lost no time in testing the legality of the Act of the majority in entering it. In 1929 the U. F. C. of S. united with the Church of Scotland (see SCOTLAND, CHURCH OF). See also UNION OF CHURCHES.

United Irishmen, society founded in Belfast in 1791 by Theobald Wolfe Tone (q.v.), mainly in order to secure the political emancipation of Rom. Catholics and Dissenters. It was strongly influenced in its organisation and aims by the Fr. Revolution. In 1795 it became a secret, oath-bound society, and it pursued revolutionary aims which culminated in the risings of 1798 (see IRELAND, History). Among its members were Tandy, Emmet, and Lord Edward Fitzgerald (qq.v.). See R. Madden, *The United Irishmen*, 1858; R. J. McHugh (ed.), *Carlton in '98*, 1949.

United Kingdom, comprises the political entity of England, Wales, and Scotland.

The title, prior to the Irish Treaty of 1921, was the 'United Kingdom of Great Britain and Ireland.'

United Methodist Church, *see under* METHODISM.

United Nations, Charter of the, instrument for maintaining peace which the great powers offered the world in place of the covenant of the League of Nations at the conference of the U.N. held in San Francisco. (On the origins of the charter *see* SAN FRANCISCO CONFERENCE.)

The main purposes of the C. of the U.N. are the maintenance of peace on the basis of justice and the promotion of friendly relations and co-operation in all matters; but the U.N. are also committed to the collective encouragement of 'respect for human rights and for fundamental freedoms for all without distinction as to race, sex, language, or religion.' The principles recognise the sovereign equality of all Member-States of the organisation (U.N.) and bind Members to fulfil their obligations under the Charter in 'good faith,' and to settle their disputes in such a way that neither peace nor justice are endangered. The organisation is to ensure that states which are not members observe the same principles, as far as is necessary for maintaining peace. It is expressly stated that the organisation has no power to interfere in the internal affairs of a state except in so far as this may be necessary when the Council is taking action to compel the settlement of a dispute. The Charter provides that all Member-States shall be represented in the General Assembly by not more than 5 delegates. The Assembly may discuss all matters relating to peace and security and make recommendations *except* when the Security Council is dealing with an international dispute. In that case the Assembly must not make any recommendation on the subject unless the Security Council asks it to do so. On all other matters (e.g. international law, health, and social questions), the Assembly shall 'initiate studies' and make recommendations. Under the Charter the Assembly apportions the expenses of U.N. and approves its budget. The Security Council consists of 11 Member-States, 5 of whom shall be Britain, China, France, the U.S.A., and the U.S.S.R. These are permanent members. The other 6 are elected by the Assembly and serve for 2 years. The Council acts on behalf of the whole U.N. in the settlement of disputes. It must seek peaceful settlement, by methods specifically laid down in the Charter. At any stage of a dispute which the parties are trying to settle peaceably, the Council may recommend a means of settlement. The disputing parties are obliged, in any case, to refer the dispute to the Council if they fail to reach agreement. The course of action of the Council when it decides that there is a threat to peace or an act of aggression, is also laid down: *inter alia*, it may call on members of the U.N. to interrupt economic relations, to stop communications, and to sever diplomatic relations with any state or states, and if these and

other prescribed methods fail, it may call for a demonstration of force or for actual military operations by some or all Member-States. For this purpose each Member-State must agree with the Council, by a separate treaty, upon the nature and extent of the forces it can supply on call. Each Member-State also undertakes to hold an air-force contingent, of an agreed strength, in readiness for immediate action. In all plans for collective action and for the strategic direction of joint operations, the Council will have the assistance of a Military Staff Committee. All Member-States keep the right of self-defence if attacked with armed force before the Council deals with the situation. An additional responsibility of the Council is to make plans for the reduction of armaments, and in this it will be assisted by the Military Staff Committee. Voting on the Council is as follows: all decisions will require an affirmative vote of at least 7 out of 11 members. There is no other stipulation for 'matters of procedure,' but in all more important decisions all the 5 permanent members must be agreed. A state, however, which is a party to a dispute must abstain from voting if the dispute is under consideration for peaceful settlement. The Charter does not preclude regional arrangements between groups of states for the purpose of maintaining peace. Member-States who are parties to such arrangements should use them for the peaceful settlement of local disputes, reporting all measures to the Security Council; but no 'enforcement action' should be taken under a regional arrangement except with the authorisation of the Council, or in the case of attack by one of the states who have been enemies of the U.N. in the Second World War. Provision is made for setting up an Economic and Social Council of 18 Member-States elected in the Assembly for a term of 3 years at a time. Its general objects are to promote higher standards of living, full employment, the solution of international, economic, social, and health problems, universal respect for the observance of human rights and fundamental freedoms. The Charter also provides that Member-States which administer colonial empires subscribe to the principle that the interest of native inhabitants is paramount. Under this chapter of the Charter an International Trusteeship system has been established for the administration and supervision of existing mandated territories, which thereafter might be detached from enemy states as a result of the Second World War, and territories which might be voluntarily placed under the system by their administering states. Provision is made for an International Court of Justice to be set up by a special Statute, to be the main judicial organ of the U.N. and to give an advisory opinion on all legal matters as well as adjudicating in justiciable disputes. All Treaties must be registered with the Secretariat of U.N. and published by it, otherwise they will not be recognised by the U.N. Obligations under the Charter override any other treaty obligations for Members of the

U.N. Amendments of the Charter require a two-thirds majority of the Assembly, including all the Great Powers, providing the votes are ratified by the Governments in each case.

Achievements of the United Nations. As late as 1949 virtually all the acute political problems before the Security Council and other organisations remained in a state of deadlock, chiefly as a result of what was styled the Russian 'peace offensive.' Fundamental differences existing between W. and E. had further diminished the effective working of the Security Council in its subsidiary bodies in all but active conflicts, but for this very reason added weight was now given to the position of the General Assembly.

The most revolutionary concept in the C. of the U.N. is the use of majority voting to decide matters of substance. The risks of the majority procedure, however, were limited by giving each of the permanent members of the Council the right of veto and by restricting the powers of the Assembly to discussion and recommendation. To some extent these prudent precautions have been stultified by the disputes between Russia and the W. Furthermore, the abuse of the veto by Russia in the Council has imposed a correspondingly greater burden on the Assembly than it was ever intended to bear.

It was never foreseen that the Assembly would be asked to give decisions, as opposed to recommendations, nor was it foreseen that it would be invited to decide on such complex problems as Palestine and the It. colonies. The dangers of this development were not apparent to the W. Powers, because on most issues the majority of the Assembly were always on their side against the Soviet Union and its satellites. But by the end of the fourth Assembly it was evident that there were other majorities: a majority of small powers against great powers, of powers without colonies against colony-owning powers, and a majority of non-European powers against the older nations of Europe. As more nations were admitted to U.N., these groupings of powers became more obvious, the most significant new group being, by 1956, the so-called 'Afro-Asian' group, which, when united, could outvote the W. powers.

The first supreme test of the efficacy of the U.N. organisation in resisting aggression came in June 1950, when the Security Council decided (27 June) to invoke the provisions of the Charter for the use of military sanctions against the N. Korean Communist-directed attack on the Rep. of S. Korea. As a measure of collective security the council's action was unprecedented. The 7 affirmative votes in the council all came from the W. States, but in a few days some 40 nations had endorsed the action taken. According to the Charter, Russia, one of the 5 permanent members of the Council, should give a concurring vote in any decisive recommendation. Owing to Russia's boycott of the Council, however, a convention had evolved (acknowledged in the past by Russia itself) under which the abstention

of a permanent member at the time of voting should not be counted as a 'veto' against the vote, and it seems to be assumed that in this context 'abstention' is the same thing as 'absence.' Subsequently the Russian deputy foreign minister (Gromyko) denounced the Amer. intervention as inspired by aggressive plans and as an unwarranted intervention in the domestic affairs of Korea. The Korean crisis burst on the world on 25 June. The first American troops landed in Korea to help to defend the rep. on 30 June. In July MacArthur was appointed supreme commander of all U.N. forces in Korea (*see further under KOREAN WAR*). A truce was not finally signed until July 1953, and though this left the way open for a settlement involving the eventual reunion of N. and S. Korea, this was not followed up. In practice, the truce restored the boundaries virtually as they had been before N. Korean aggression started. But the authority of U.N. had been successfully asserted; without armed intervention it is reasonable to suppose that S. Korea would have been permanently occupied by the Communists. However, in assessing the significance of the Korean episode in U.N. hist. it is important to note that action took place on U.S. initiative. Whether effective action could have taken place in any other circumstances is doubtful.

Subsequent hist. suggests that U.N.'s effectiveness is very limited on major issues unless, as in Korea, it has the active backing of one or more of the great powers, or is putting pressure on a state or states whose susceptibility to domestic and foreign public opinion gives it a moral obligation to concur. For example, resolutions passed on allowing free Israeli passage through the Suez Canal or on the Kashmir problem have been ignored by the states concerned.

In Oct. 1956 Israel forces invaded Egyptian terr. and after an ultimatum, demanding the Egyptian and Israeli forces to stop fighting, had expired, Anglo-Fr. forces began an aerial bombardment of Egyptian military targets, followed by troop landings (Nov.). This, it was stated, was done solely to separate the combatants and to safeguard the Suez Canal. France and Britain had already (Oct.) used the veto in the Security Council to defeat a resolution calling upon Israel to withdraw behind the armistice line of 1949. Their military action was, however, condemned by the U.N., the U.S.A. taking a leading part in achieving this, and subsequently Fr. and Brit. troops withdrew, leaving a U.N. force made up of small contingents from sev. countries (including Danes, Yugoslavs, Swedes, and Norwegians) to restore order in the area. The U.N. was also to supervise the clearing of the Suez Canal blocked by Egypt early in the fighting; but subsequently it was not clear whether U.N. was either prepared to try to settle the Arab-Israeli problem on a permanent basis or whether, indeed, it had the capacity to do so.

The Fr. and Brit. action in complying with U.N. resolutions demanding their withdrawal is in contrast to the attitude of Soviet Russia, who, called upon by the General Assembly on 8 Nov. 1956 to withdraw her troops from Hungary, entirely ignored the request. The sev. U.N. resolutions on Hungary were useless in preventing the crushing by force of the Hungarian revolution by Soviet troops; for Russia felt under no moral compulsion to regard them, and no major power was prepared to risk a world war by taking active and immediate action as it had in Korea 3 years previously.

See H. V. Evatt, *The United Nations*, 1949; E. P. Chase, *The United Nations in Action*, 1951; Trygve Lie, *In the Cause of Peace*, 1954; A. M. Rosenthal, *The United Nations: its Record and Prospects*, 1954; U.N.O., *Everyman's United Nations* (5th revised ed.), 1956; *Annual Review of United Nations Affairs* (periodical).

United Nations Educational, Scientific, and Cultural Organisation, see U.N.E.S.C.O.

United Nations Organisation (U.N.O.), see under UNITED NATIONS, CHARTER OF THE.

United Nations Relief and Rehabilitation Administration (U.N.R.R.A.), formed in 1943, to meet what were expected to be 2 broad needs after the termination of hostilities, viz. immediate relief and assistance in economic rehabilitation. U.N.R.R.A. was compelled, by the conditions it found, to concentrate primarily on the former. Its function was, moreover, limited to helping those war-ravaged countries which lacked the foreign-exchange resources to meet their own import requirements. The administration's major operations were virtually completed by the earlier half of 1947, but its activities had by then estab. the foundation for the future measures to be taken in the direction of world economic well-being.

The first shipload of U.N.R.R.A. supplies was sent in Mar. 1945. By the close of its operation, U.N.R.R.A. had delivered about \$3000m. worth of supplies, in volume 25,000,000 long tons, to 17 different countries.

United Nations War Crimes Commission, international corporation estab. in Oct. 1943 at a meeting of the representatives of 17 nations held at the Brit. Foreign Office. Originally the Commission was intended to 'investigate and record the evidence of war crimes' and to 'report to the Governments concerned . . .' But it was eventually decided that it should also be charged 'with advising the Governments concerned upon matters of a technical nature, such as the sort of tribunals to be employed for the trial of war criminals, the law to be applied, the procedure to be adopted, and the rules of evidence to be followed.' It was not, however, empowered to make any decisions which would be binding upon the govs. for the guidance of which it made recommendations. Early in 1944 the Commission recommended to the allied

govs. that the retributive action of the U.N. should not be restricted to what was traditionally considered a war crime in the technical sense, i.e. a violation of the laws and customs of war, particularly embodied in The Hague and Geneva Conventions. Their proposals had much influence on the conclusion of a Four-Power Agreement dated 8 Aug. 1945, establishing the International Military Tribunal, in particular on its provisions for the punishment of 'crimes against humanity,' which include murder, extermination, enslavement, deportation, and other inhuman acts committed against any civilian pop. before or during the War. The Allied govs. also accepted the view of those of the members of the Commission who held that in the state of International Law as it existed in 1939 the initiation of an aggressive war was not only illegal but criminal. This view was included in the Four-Power Agreement and was upheld in the judgment at the Nuremberg Trial (q.v.). The Commission also recommended that measures should be taken against the members of criminal organisations, such as the Gestapo. A unanimous resolution of the General Assembly of U.N.O. in 1946 approved the principles in the Nuremberg judgment. It remains to be seen whether those principles will be applied in practice in international law. See also **CRIMES, WAR**.

United Presbyterian Church, see SCOTLAND, CHURCH OF.

United Press Association, Amer. news service using cables, telegraph, radio, and telephone, was founded in New York in June 1907 by the combination of 3 older organisations. It was decided at the start that it should be non-exclusive in principle. In other words, it would sell its news service in any city to as many newspapers as desired to buy it. To maintain absolute independence in the presentation of news, it was also decided that it would make no news-exchange arrangements with any of the so-called 'official' news agencies so common in Europe. This added greatly to the expense at the start, as it necessitated setting up its own bureaux in all the leading European countries. It started business with a nucleus of 247 newspapers in the U.S.A.; in 1908 it secured its first customers in Japan; in 1916 it made important arrangements in S. America; in 1919 it started serving both morning and afternoon papers; and in 1921 it invaded the European sales field. In 1956 it was furnishing news to 1865 newspapers in 71 different nations and ters, and printed in 48 languages. In 1939 Scripps News was merged in the U.P.A. News is distributed in Great Britain and the Brit. Dominions by the Brit. United Press (originated in 1922). United Feature Syndicate, a subsidiary of the U.P.A., supplies feature material, such as articles by well-known columnists, feature writers, and comic artists. Another subsidiary, Ocean Press, transmits world news by radio to ships at sea. The U.P.A. maintains a hundred-and-one bureaux distributed in every important world news

centre, from which staff correspondents send out news messages by cable and wireless. In London is situated the divisional office for all Europe, and from there news goes to all the Brit. Commonwealth.

United Provinces of Agra and Oudh, see UTTAR PRADESH.

United Service Institution, see ROYAL UNITED SERVICE INSTITUTION.

United Society for Christian Literature, undenominational and international organisation engaged in promoting, publishing, and distributing Protestant Christian literature in many parts of the world. It began as the Religious Tract Society in 1799, united with the Christian Literature Society for India and Africa in 1935, and later included committees in London and Scotland associated with the Christian Literature Society for China.

United States Air Force. ORGANISATION AND MISSION. The Dept. of the Air Force was estab. within the Dept. of Defense under the terms of the National Security Act of 1947 as co-equal with the Depts. of the Army and the Navy. The Air Force was activated on 18 Sept. 1947 with the appointment of Stuart Symington as first Secretary of the Air Force. The U.S.A.F., under the administrative control of the Dept., came into being at the same time, and Gen. Carl Spaatz was appointed the first Chief of Staff.

The Air Force has primary responsibility for the air defence of the U.S.A., strategic air warfare, defeating enemy air forces, furnishing close combat support to the Army, and interdicting enemy land power. To accomplish these missions, it is organised into 18 major commands on a functional basis, of which 3, the Air Defense, Strategic Air, and Tactical Air, are combat commands. The support commands are Air Materiel, Air Proving Ground, Continental Air, Air Research and Development, Air Training, Air Univ., Military Air Transport Service, Air Force Academy, Air Force Finance Div., U.S.A.F. Security Service, and H.Q. Commands located overseas are the Pacific Air Forces, the U.S.A.F. in Europe, the Alaskan Air Command, and the Caribbean Air Command.

History. On 1 Aug. 1907, nearly 4 years after the Wright Brothers succeeded in flying a powered heavier-than-air aircraft, the U.S. Army estab. an Aeronautical Div. in the Office of the Chief Signal Officer. It was not until Mar. 1911 that Congress made the first regular appropriation of \$125,000 for the fledgling air force. In July 1914 Congress estab. the Aviation Section of the Signal Corps, and earmarked \$600,000 for aeronautical development. In its first field operations on the Mexican Border, in the spring of 1916, the Aviation Section's performance was not impressive. Its aircraft broke down under combat conditions against Pancho Villa, and had to be abandoned or condemned. This experience showed the need for higher-powered aircraft.

The First World War. Following the U.S. declaration of war in 1917, Congress voted the sum of \$640m. for military aeronautics. During its participation in the War the U.S.A. produced about 11,000 planes at home, and purchased about 5000 more abroad. Army aviators made about 13,000 pursuit flights, 6600 observation flights, and 215 bombing missions. On these missions they dropped 275,000 lb. of explosives. Combat losses totalled 289 planes, as opposed to confirmed enemy losses of 781 planes. In May 1918 aviation was removed from the Signal Corps and set up as the Air Service under the Secretary of War in order to meet the need for greater operational flexibility. At the close of hostilities in Nov. 1918 Air Service personnel numbered about 185,000, but the post-war demobilisation brought this figure down to less than 10,000 by June 1920. At that time the Air Service became an arm or line of the Army, and increased its regular personnel authorisation to 17,500 officers and enlisted men. The Air Corps Act of 1926 changed the name of the Air Service to Air Corps, and emphasised its major role as that of maintaining a strike ability rather than merely performing auxiliary services for other branches of the Army. During the 1930s military air power in the U.S.A. languished, as it did among the other W. democracies. The renaissance, spurred as much by Hitler's rise to power as by any other factor, quickened interest in the U.S.A. sufficiently to permit the estab. of the G.H.Q. Air Force in 1935. Military air power was for the first time given a mission beyond that of supporting ground forces.

The Second World War. The astonishing successes reaped by the Luftwaffe in Poland in Sept. 1939 and in W. Europe in May-June 1940 spurred an all-out armament programme to the point where the President called for production of 50,000 planes a year. Before Pearl Harbor, in 1941, the U.S. Army A.F. was created to co-ordinate all relevant air matters, and in Mar. 1942, following the U.S. entry into the war, the U.S. Army A.F. was elevated to co-ordinate status with the Army Ground Forces and the Services of Supply within the War Dept. The U.S. Army A.F. achieved practical autonomy, which it maintained throughout the War. It experienced the greatest expansion within the U.S. military establishment during that period. Its ann. appropriation was increased from about \$75m. at the beginning of the War to \$20,000m. in 1945. Between Pearl Harbor and the end of the War, U.S. Army A.F. personnel rose from just under 150,000 to 2,411,000, and the number of aircraft from 4000 to 80,000. The U.S. Army A.F. made a great contribution to victory in the Second World War. In the fight against Germany it reached a peak of more than 13,000 combat planes, operated by 619,000 men. More than 750,000 bomber sorties and 1,000,000 fighter sorties were flown. The U.S. Army A.F. dropped 1,500,000 tons of

bombs and destroyed more than 35,000 enemy aircraft, while losing about 18,000 aircraft. Against Japan it flew more than 669,000 sorties, the 20th Air Force alone accounting for about 40,000. More than 500,000 tons of bombs were dropped on Japan and its islands, and more than 10,000 Japanese aircraft were destroyed, while U.S. Army A.F. losses amounted to about 4500. On 6 and 9 Aug. 1945, 2 U.S. Army A.F. B-29s dropped single atomic bombs on Hiroshima and Nagasaki, respectively, marking the first use of atomic energy for military purposes. The detonations caused over 100,000 casualties, and over 50 per cent of the built-up areas of both cities were destroyed. Japan sued for peace, and the War officially ended with the surrender aboard the U.S.S. *Missouri* on 2 Sept. 1945.

1945-1950. As it did after the end of the First World War, the strength of the military air arm dropped precipitately, from 2,250,000 in Sept. 1945 to 734,000 on 1 Jan. 1946, 5 months later. By 1947, the U.S. Army A.F. personnel strength reached its ebb, barely exceeding 300,000. The ann. appropriation fell to \$2000m. Aircraft fell from a war-time high of 80,000 to about 40,000, and in June 1947 only 11 of 38 groups manned were considered operationally effective. In its post-war planning the U.S.A.F. had developed the 70-group goal as a minimum peace-time force, but reductions of its appropriations and troop bases did not permit expansion to this goal. Meanwhile, the Soviet Union erected what Winston Churchill called an 'Iron Curtain' between E. and the W. In the face of growing Russian intransigence, the W. remained in a state of virtual demobilisation. The U.S.A.F., which had developed an atomic capability and the long-range bombers to deliver these weapons on target, decided to retain the striking integrity of the Strategic Air Command within the 48-group programme limitations imposed upon it. This capacity for swift atomic retaliation proved to be the greatest single deterrent to major Communist aggression. Then, on 12 June 1948, the Russians clamped a land blockade on the city of Berlin, which became dependent on airlift for the necessities of life. U.S.A.F. aircraft went into action immediately, and within 5 days large-scale operations began, the daily haul rising to 6000 tons on many occasions. By the end of 1948 the combined U.S.-British airlift (which included U.S. Navy and R.A.F. transports) had exceeded 700,000 tons, or more than the total flown over the 'Hump' from India over the Himalaya Mountains into China during the Second World War. On 12 May 1949 the Russians lifted the land blockade, and the airlift gradually declined, ceasing entirely on 30 Sept. 1949. In 15 months 1,783,826 tons of supplies had been flown into Berlin, and the Russians had suffered a damaging blow to their prestige. 'Operation Vittles', as the Berlin airlift was called, was the nation's first important peace-time use of air power as an instrument of national policy.

The Korean War. The U.S.A.F. began operations in Korea on 27 June 1950, 2 days after the N. Korean Communists invaded the Rep. of Korea. During the 3 years of the conflict, ending when the Armistice was signed on 27 July 1953, U.S.A.F. air action destroyed more than 1000 enemy aircraft, including 838 of the Russian-built MIG-15s, and put out of action some 81,000 supply vehicles, 10,000 railway cars, and 1300 tanks. In addition, an estimated 180,000 of the enemy's troops were killed or wounded.

The Korean War had far-reaching effects on the nation and the U.S.A.F. The full realisation of Communism's aggressive intent in world affairs pointed the necessity of maintaining strong military forces in constant readiness for long periods of time. Entering the Korean War with only 48 wings, the U.S.A.F. embarked upon an expansion programme which went through a series of progressive changes—from 48 to 95, and to 143. The end of the Korean War brought about a reappraisal of the nation's military posture, and in the autumn of 1953 a new goal of 137 wings was set for the U.S.A.F., to be achieved by 30 June 1957.

1953-1957. The U.S.A.'s and subsequently the U.N.'s response to the aggression in Korea had been able to cope with the immediate threat. In the long term, on the basis of identity of interest, the sovereign nations around the rim of the Atlantic Ocean had been impelled to seek a relatively permanent mechanism for the pooling of their resources, and this evolved, beginning in 1949, as the North Atlantic Treaty Organisation. Obviously, air power would play a leading role in this mutual defence structure. To this end, in addition to building up its active force, the U.S.A.F. also planned to rely upon numerous forward overseas bases to improve its combat capability, including a number in the United Kingdom. In Mar. 1951 construction had begun at Thule, Greenland; and this base in the Far N. had become operational in Sept. 1952. Also in 1951 the U.S.A.F. had initiated construction of bases in Fr. Morocco, and in Sept. 1953 the U.S.A. and Spain signed an agreement permitting Amer. forces to utilise Spanish air and naval installations, which became operational in 1957. In Oct. 1953 Greece also gave the U.S.A. permission for joint use of several air and naval bases. Similar agreements were made with Iceland for use of the airfield at Keflavik, with Denmark for air bases in Greenland, and with Portugal for the use of air bases in the Azores. Meanwhile, in step with technological development, the U.S.A.F. began the long transition from planes to missiles for some of its missions. In 1954, 2 units of B-61 Matadors, a tactical guided missile, were assigned to Germany for duty with the N.A.T.O. defence forces. The intercontinental ballistic missile (I.C.B.M.) with a range of 5500 miles was given the highest national priority in Nov. 1955, and the U.S.A.F. was assigned the responsibility of developing and plac-

ing it into operation. In Nov. 1956 the Air Force was given operational responsibility for the intermediate-range ballistic missile (I.R.B.M.) with a range of 1500 miles. Until such missiles have become available in quantity, and have achieved an acceptable degree of reliability, however, the U.S.A.F. places its main reliance upon manned aircraft to perform its missions. Three B-52 jet bombers, for example, in Jan. 1957 completed a round-the-world flight which covered some 24,325 miles in 45 hrs and 18 min., a dramatic example of Strategic Air Command's retaliatory capability. In the fiscal year starting in July 1957 the Air Force manned its 137-wing structure with 919,331 military personnel, and a budget of nearly \$16,000m. An additional \$900m. was appropriated for the construction and improvement of bases. The bulk of these funds was earmarked for modernising the long-range bomber force, improving the capability of the day fighter and interceptor force, and increasing the reliability of the guided-missile systems. With assets of over \$70,000m., the U.S.A.F. had become the largest single business enterprise in the U.S.A., spending 1 out of every 2 defence dollars and 1 out of every 4 tax dollars.

United States Architecture, see AMERICAN ARCHITECTURE.

United States Army, formally created on 14 June 1775, when the Continental Congress authorised an army to defend the rights of the Colonies. Three weeks later, on 3 July 1775, Gen. George Washington assumed command of the motley colonial militia units besieging Brit. troops in Boston. The character of the first commander, his brilliant field leadership, clear-sighted insistence on high standards of training and discipline, courage under fire, perseverance in the face of adversity, and unquestioning recognition of the supremacy of civil authority over the nation's military forces, left an indelible mark on the Army. Gen. Washington was also responsible for the first clear expression of sound Amer. military policy. He recognised the need for a deterrent force to man the ramparts of freedom wherever they might be. He urged the estab. of a professional school for officers, and the creation of a well-trained, well-organised reserve force. Congress at first ignored Washington's recommendations, and in 1784 the Army was reduced to 80 men. But the depredations of the Indians soon forced expansion. Some untrained units were defeated by the Indians, until Gen. Anthony Wayne created a disciplined force that he led to victory at Fallen Timbers in 1794, bringing peace to the frontier.

In 1802 the founding of the U.S. Military Academy at West Point fulfilled one of Washington's recommendations. In 1803, following the Louisiana Purchase, the way to the Pacific was explored by an Army expedition under Capt. Meriwether Lewis and Lieutenant Wm Clark.

When war with England came again in 1812 the nation's failure to adopt Washington's recommendations for trained

active and reserve forces resulted in defeats and the unnecessary loss of life that accompanies military incompetence. Fortunately, however, 4 gens. understood the need for training and discipline. Gen. Wm H. Harrison at the battle of the Thames assured continued Amer. control of the NW. Ter.; Gens. Jacob Brown and Winfield Scott trained troops which out-fought Brit. regulars along the Niagara Riv. frontier; and Gen. Andrew Jackson's victory at New Orleans sealed Amer. control over the Mississippi.

After the War of 1812 a much-reduced army continued to protect settlers against the Indians and to explore the W. During this period, Army engineers began to construct the great network of railroads which played so important a part in the growth of the nation.

In the Mexican War (1846-8) the small but well-trained Regular Army, augmented by volunteers, overcame larger Mexican forces solely because of higher standards of leadership, training, and discipline. Mexico was forced to cede territory, which increased the size of the U.S. by about one-third; though this greatly increased the Army's responsibilities, its strength was reduced to 16,000 men.

The Amer. Civil war proved to be one of the monumental conflicts of world history. It was a long, costly, bloody war in which troops and leaders on both sides displayed great valour and, after experience in battle, great ability. The Civil war, historically, was the first really modern war. Both sides made significant use of the telegraph and railways, and developed greatly improved weapons of all types. After peace was re-established, the Army was reduced again in size—this time to 25,000—and its attention turned again to peace-time activities, mostly protecting settlers against Indian depredations. The Indian wars, so important in the heritage of the Army, finally ended in 1898. That same year saw the beginning of the conflict with Spain. The Army, transported to Cuba and the Philippines by the Navy, quickly and decisively defeated Sp. ground forces. The Army's accomplishments, during and after the Sp.-Amer. War, in controlling tropical diseases won world-wide renown, and also facilitated the building of the Panama Canal by Army engineers.

In 1914 the First World War began, and in 1917 the U.S. joined the Allies. By Nov. 1918, 2,000,000 men were in France. These Amer. reinforcements helped to tip the balance of military power and ensure Allied victory over Germany.

Although neglected and reduced after the First World War, the Army was perhaps better prepared for the Second World War than for any previous war. At last it had reserve forces of the kind Washington had recommended—the National Guard and Organised Reserve Corps—and the Army was able to expand rapidly and efficiently after initial reverses at Pearl Harbor and in the Philippines. The keynote of the Second World War was the teamwork of ground, air, and naval forces. This was

particularly significant in the amphibious operations which formed the basic pattern of the war against Germany and Italy, as well as against Japan. It was a war of movement, with the infantry-armour-artillery team carrying the burden on the ground, and airborne units giving the Army great strategic mobility.

Rapid demobilisation after the Second World War hampered the Army's effectiveness in carrying out U.S. policies and commitments throughout the world. This weakness was exploited by the Russians. In June 1950 the Russian-sponsored N. Korean Army invaded S. Korea. After a rapid initial success, the N. Koreans were finally stopped and then completely routed by U.N. forces. Communist China then entered the war in overwhelming strength, forcing U.N. troops to withdraw into S. Korea. A U.N. counter-offensive drove the Communists back into N. Korea before the front became stabilised as a result of truce negotiations.

With the purpose of reinforcing the will and ability of other nations to resist communism, the Army's military missions and aid groups are to be found in 44 countries, from Korea to N. Europe. In this effort some 200 foreign divs. are being strengthened. Owing to the U.S. Army's assistance, many of the smaller and weaker nations are developing confidence in their ability to defend themselves. U.S. military men are at the potential trouble spots of the world; their presence is a reassurance to other nationalities that the U.S. accepts its share of responsibility in the fight for peace. The major effort of the U.S. Army is to help to deter war in any form, from a guerilla campaign to a nuclear conflict. The Army must be prepared to fight any type of war in any climate or terrain. It must so organise, dispose, and deploy its forces as to create in the mind of a potential aggressor a clear conviction that any aggression will be contested and will fail in the end.

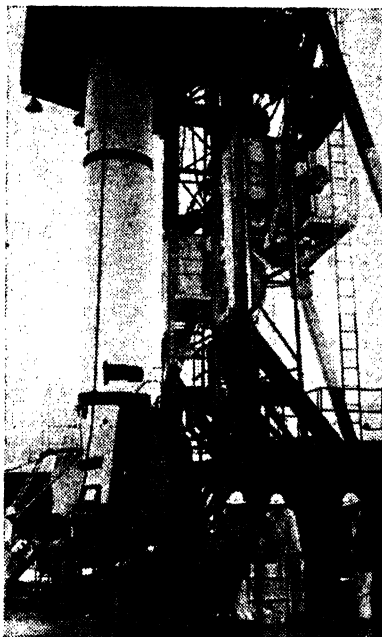
The U.S. Army has combat-ready forces stationed in Europe and in the Far E. These forces constitute military obstacles to aggression. In Europe the U.S. Seventh Army forms a significant part of the N.A.T.O. shield deployed against the Iron Curtain. A reinforced corps of 2 divs. stands alert on the armistice line to ensure peace in Korea. In all, some 40 per cent of the U.S. Army is overseas.

The U.S. Army seeks to create in its military organisation a strength derived from quality rather than from quantity. For this reason, the Army has modernised its fire-power and structure in the last 10 years. It has developed new weapons, tested new tactical organisations, and has tailored units towards the requirements of atomic war. The Army now has the ability to buttress military power with weapons of great flexibility, ranging from the pistol of the military policeman to the atomic warhead of the guided missile.

As in the wars of the past, success in land combat in the foreseeable future will continue to depend upon the proper

combination of 3 essential elements—fire-power, movement, and personnel. First, a word about fire-power as the U.S. Army regards it at the present time.

The rocket and guided missile will provide the heavy fire-power required by army forces in this period. Already some of these new weapons are operational and are in the hands of Amer. troops at home and abroad. Soon the U.S.A. will have sev. short-range missiles to deliver fire-power in support of front-line troops. The Honest John rocket—already available—plus the Little John and Lacrosse, the primary missiles which can be sited in areas well protected from enemy action and which can fire many miles into enemy ter., are already in the hands of Amer. troops in some cases and, in others, are in



*U.S. Information Service:
American Embassy*

THE EXPLORER III MISSILE

the latter stages of test and development. The Corporal (which is now operational) and the Redstone are such weapons. These missiles will allow the U.S. Army to deliver, from virtually impregnable positions, devastating atomic fire ranging many miles into enemy territory.

Missiles will provide improved ground-to-air as well as ground-to-ground fire-power. Conventional anti-air artillery will largely disappear from the active

army. For defence against enemy aircraft, the U.S. Army will place prim. dependence on missiles, particularly the Nyke family of weapons, in which Nyke-Hercules (formerly called Nyke B) will become the prim. member. Nyke-Hercules will be provided with an integrated system of control in local defence through the U.S. Army's electronic 'Missile Master' data-handling device. This system, in turn, will be co-ordinated with the nation-wide control organisation of the Continental Air Defense Command. The Talos missile system may soon be operational, and could be incorporated into the Army's anti-air system.

The U.S. Army is obtaining increasing mobility by improving its basic combat organisation, by reducing the weight and bulk of its weapons, and by providing better equipment to move its units and supplies on the battlefield. In the field of organisation, the U.S. Army is reducing the size of basic combat elements, recognising that dispersion will be the rule on future battlefields, where detection by the enemy may mean destruction.

On the ground, the U.S. Army is developing improved cross-country mobility, based upon the use of lightweight troop and weapons carriers. In the air, it looks to Army aviation to provide it with the internal mobility to survive and win on the battlefield of the future. To be of maximum utility, Army aviation must be forward, where it is immediately responsive to the requirements of the Army commander, and units must be able to operate from unprepared airfields. Because the Army is not interested in organic aircraft without this fundamental capability, there is no need for types of aircraft which would compete with the U.S. Air Force in the discharge of its approved functions.

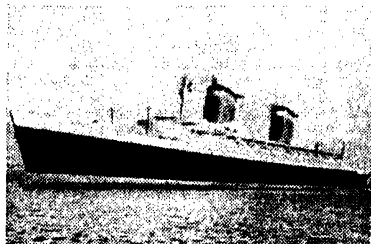
Apart from mobility on the battlefield, the U.S. Army requires strategic mobility. Here, of necessity, it looks to the Air Force for the provision of strategic airlift. The Army has been continually applying technological development to aid in reducing the weight, bulk, and quantity of equipment in its units. Thus, it is steadily progressing towards making Amer. fighting units transportable by air.

The U.S. Army must maintain forces at proper levels of readiness to be able to contribute in the discharge of national commitments. Furthermore, it must maintain ready forces which are sufficiently versatile to use both conventional and nuclear weapons. They must be highly mobile and suitably deployed to respond quickly to local aggression. Such requirements necessarily influence the size and composition of the force structure, the type of people in the Army, and their training.

Finally, the number of people in the U.S. Army is affected by the location of troop units. Overseas deployments determine to a large degree the overall strength which must be maintained. With a 3-year overseas tour, which is about the practical limit, the U.S. Army has learned by experience that for every 100 men overseas, it must have 150 at home to

provide a training-base replacement system for the individuals and units abroad.

United States Lines, Amer. steamship company, estab. in 1921, and acquired in 1930 by the International Mercantile Marine Company (founded in 1903 and incorporating the old American Line, which first operated just after the close of the Amer. Civil war). Passenger liners of the U. S. L. are the world's fastest, *United States* (53,330 gross tons), holder of the Blue Riband of the N. Atlantic, and *America* (33,532 gross tons). In July 1952, on her maiden voyage from New York (departure 3 July at 2.36 p.m.) to Le Havre, the *United States* set up a new record for the fastest Atlantic crossing of



Courtesy United States Lines

U.S. SS 'UNITED STATES'

3 days, 17 hrs, 48 min., covering the 3191 (nautical) m. at an average speed of 35.53 knots. The passage from the *Ambrose* light vessel, New York, to Bishop Rock (2949 m.) took 3 days, 10 hrs, 40 min. (average speed, 35.59 knots). The *United States* and the *America* maintain a regular service between New York and Europe. The company also own 50 fast freight vessels. Most of these cargo vessels carry 6-12 passengers and operate between the U.K., Ireland, continental Europe, and the U.S.A.; also the U.S.A. to Hawaii, the Far E., Australia, and New Zealand. Associated companies include the American Pioneer Line, which serves the Far E., the S. Atlantic Line, which operates between SE.-coast U.S.A. ports and Europe, and the Atlantic Transport Company Ltd. (q.v.).

United States (American) Literature, see AMERICAN LITERATURE.

United States Marine Corps, integral part of the U.S. Navy, under the control of the Navy Dept. Its members, like those of the Royal Marines (see MARINES), on which the U. S. M. C. was originally modelled, are trained to serve by land and air as well as on the sea, and the corps has distinguished itself in many land actions. The U. S. M. C. was founded in 1775, and is a completely self-contained unit; during the Second World War the corps had its own artillery, tanks, and air force. It took part in the Sp.-Amer. war, the First World War, and in many inter-war operations in China, Mexico, Cuba, etc. In the Second World War a small force of Amer. marines heroically defended Wake

Is. against an overwhelming Jap. attack. In 1942-3 4 divs. of the U. S. M. C. were used in an attack on the Jap-occupied Solomon and Marshall Is. When S. Korea was invaded by N. Koreans in 1950, part of the U. S. M. C. was sent to help to defend S. Korea on behalf of the U.N. In Sept. 1950 Amer. marines took part in assault-landings on the Korean coast, and assisted in the capture of Seoul, cap. of S. Korea. Lt.-Gen. Randolph Pate succeeded Gen. Lemuel C. Shepherd, Jr., on 1 Jan. 1956, as Commandant of the Corps. The average strength of the U. S. M. C. in 1955 was approximately 207,000.

United States Military Academy, see WEST POINT MILITARY ACADEMY.

United States Navy. The term 'Department of the Navy' as used in the National Security Act of 1947 is construed to mean: the Dept of the Navy at the seat of gov.; the H.Q., U.S. Marine Corps; the entire operating forces of the U.S. Navy, including naval aviation, and of the U.S. Marine Corps, including the reserve components of such forces; all field activities, H.Q., forces, bases, installations, activities, and functions under the control and supervision of the Dept of the Navy; and the U.S. Coast Guard when operating as a part of the Navy pursuant to law.

The Dept of the Navy is organised, trained, and equipped primarily for prompt and sustained combat incident to operations at sea. The Navy is responsible for naval reconnaissance, anti-submarine warfare, and the protection of shipping. The operating forces are organised into 2 main fleets, the Pacific Fleet and the Atlantic Fleet, and also into various forces such as the U.S. Naval Forces, E. Atlantic and Mediterranean, and U.S. Naval Forces, W. Pacific. The shore establishment is the portion of the Navy which may properly be described as supporting the operating forces. Organised into 14 districts, the shore establishment provides the Chief of Naval Operations with area commanders through whom he exercises his command responsibilities over activities ashore.

The supervision and direction of the entire Naval Establishment is vested by law in the Secretary of the Navy, who, in the performance of his legal duty in supervising the Naval Establishment, delegates portions of his authority to his naval and civilian executive assistants through authoritative channels. The Marine Corps is headed by its Commandant, who is appointed for a 4-year term by the President and maintains his H.Q. in Washington, D.C., as a separate component of the Navy Dept, directly under the Secretary of the Navy. Generally the corps is divided into 3 parts; the first, under control of H.Q., Marine Corps, are a number of estabs. which provide logistic support and training for the corps as a whole. The second fulfils the secondary Marine Corps mission to provide security forces afloat and ashore, and the third is the Fleet Marine Force, which includes about half of the strength of the corps.

To-day's Navy continues to move forward with its traditional strides in development and scientific progress. It is undergoing tremendous changes from steam to nuclear power, jet-propelled aircraft, and guided missiles. Two very important parts of its total striking power are the fast carrier attack force and the guided-missile submarine.

For the fiscal year 1957, the new Navy construction programme called for 23 new warships, 5000 tons of land and service craft, and 18 conversions. Also proposed was a new 85,000-ton nuclear-powered aircraft carrier. Included in the programme was the sixth attack carrier of the *Forrestal* class, a nuclear guided-missile cruiser of 11,000 tons; 4 guided-missile frigates of 4000 tons; 8 guided-missile destroyers of 3000 tons; 6 nuclear-powered submarines; 2 destroyer escorts of 1400 tons; and one 8000-ton ammunition ship. Among the Navy's operational missiles are the *Sidewinder*, an air-to-air defence weapon which protects men and ships at sea from attack by enemy aircraft. *Sidewinder* is also employed in the air defence of the continental U.S. The air-to-surface missile *Petrel* is launched by patrol aircraft outside the range of the target's air defence. The missile attacks at high speeds, sparing the pilot from anti-aircraft hazards. *Regulus*, a surface-to-surface missile, is capable of delivering a war-head over a range of hundreds of miles guided by a built-in electronic brain. The supersonic surface-to-air missile *Terrier* is designed to intercept aircraft at longer range and higher altitudes than conventional anti-aircraft guns and under all weather conditions.

Names are assigned to the following types of ships as indicated: *Battleships*, states of the Union; *Cruisers*, heavy and light, cities of the U.S.A.; *Cruisers*, large, names of territories and insular possessions of the U.S.A.; *Aircraft Carriers*, names of famous ships formerly on the Navy list and important U.S. battles. The escort class of carriers are given names of is., bays, and sounds of the U.S.A., also important U.S. operations, battles, and engagements; *Destroyers*, the names of deceased persons in (1) Naval, Marine Corps, and Coast Guard who rendered distinguished service to their country, (2) Secretaries and Assistant Secretaries of the Navy, (3) Members of Congress who were closely identified with naval affairs, (4) inventors. The *Destroyer Escort* type is named for personnel of the Navy, Marine Corps, and Coast Guard killed in enemy action in the Second World War; *Landing Ships*, places of historical interest; and *Submarines*, names of fish and denizens of the deep. The numerous additional types of vessels—mine-layers and sweepers, patrol vessels (frigates, gunboats, and yachts), and auxiliaries (tenders, repair ships, ammunition and transport and cargo ships, hospital ships, oilers, etc.) and miscellaneous craft are all given names in accordance with an agreed pattern. The names of these types and classes vary widely, including Indian chiefs and

tribes, mythological characters, volcanoes, mountains, countries, and deceased Naval and Marine Corps personnel.

The strength of the U.S. Navy for the period ending 30 June 1957, taken from the 1956-7 edition of *Jane's Fighting Ships*, was a total of 4500 ships. Of these 1000 were in active service and 1500 in the Reserve Fleet. This does not include service craft. Beyond the strength of ships and planes alone lies one of the Navy's greatest assets—highly trained personnel whose pioneering spirit in

research and devotion to country have made the U.S. Navy one of the greatest military forces in history. The U.S. Navy to-day, equipped with some of the most advanced weapons of the nuclear age, gives the U.S.A. a strong and mobile force to keep the sea lanes free and to deter aggression. See also NAVY, DEPARTMENT OF THE.

United States of America, federal rep. of 48* sovereign states. Its constitution is written. Each state has a similar fundamental law. The U.S.A. lies roughly

STATES

State and Abbreviation		Date of Admission to the Union	Gross Area* in sq. m.	Census Pop. 1950	Estimated Pop. 1954	Capital
Alabama	Ala.	1819	51,609	3,061,743	3,121,000	Montgomery
Alaska		1958	590,884		128,600	Juneau
Arizona	Ariz.	1912	113,956	749,587	993,000	Phoenix
Arkansas	Ark.	1836	53,335	1,909,511	11,910,000	Little Rock
California	Calif.	1850	158,693	10,586,223	2,554,000	Sacramento
Colorado	Colo.	1876	104,207	1,325,059	1,456,000	Denver
Connecticut	Conn.	1788	5,009	2,007,280	2,218,000	Hartford
Delaware ¹	Del.	1787	2,057	518,085	367,000	Dover
Florida	Fla.	1845	58,560	2,771,305	3,524,000	Tallahassee
Georgia	Ga.	1788	58,800	3,444,578	3,680,000	Atlanta
Idaho	Id.	1890	83,557	588,637	613,000	Boise
Illinois	Ill.	1818	56,400	8,712,176	9,165,000	Springfield
Indiana	Ind.	1816	36,291	3,934,224	4,209,000	Indianapolis
Iowa	Ia.	1846	56,280	2,621,073	2,638,000	Des Moines
Kansas	Kans.	1861	82,158	1,905,299	2,016,000	Topeka
Kentucky	Ky.	1792	40,598	2,944,806	2,995,000	Frankfort
Louisiana	La.	1812	48,523	2,683,516	2,924,000	Baton Rouge
Maine	Me.	1820	33,215	913,774	930,000	Augusta
Maryland ¹	Md.	1788	10,577	2,343,001	2,602,000	Annapolis
Massachusetts ¹	Mass.	1788	8,257	4,690,514	4,954,000	Boston
Michigan	Mich.	1837	96,720	6,371,766	7,024,000	Lansing
Minnesota	Minn.	1858	84,068	2,982,483	3,103,000	St Paul
Mississippi	Miss.	1817	47,716	2,178,914	2,204,000	Jackson
Missouri	Mo.	1821	69,770	3,954,653	4,154,000	Jefferson City
Montana	Mont.	1889	147,100	591,024	628,000	Helena
Nebraska	Nebr.	1867	77,237	1,325,510	1,366,000	Lincoln
Nevada	Nev.	1864	110,540	160,083	218,000	Carson City
New Hampshire ¹	N.H.	1788	9,341	533,242	532,000	Concord
New Jersey ¹	N.J.	1787	7,836	4,835,329	5,250,000	Trenton
New Mexico	N.M.	1912	121,511	681,187	1,781,000	Santa Fé
New York ¹	N.Y.	1788	49,204	14,830,192	5,433,000	Albany
North Carolina	N.C.	1789	52,426	4,061,929	4,250,000	Raleigh
North Dakota	N.D.	1889	70,665	619,636	636,000	Bismarck
Ohio	O.	1803	41,222	7,946,627	8,554,000	Columbus
Oklahoma	Okl.	1907	69,919	2,233,351	2,268,000	Okla. City
Oregon	Oreg.	1859	96,980	1,521,341	1,639,000	Salem
Pennsylvania ¹	Pa.	1787	45,339	10,498,012	10,799,000	Harrisburg
Rhode Island ¹	R.I.	1790	1,214	791,896	824,000	Providence
South Carolina ¹	S.C.	1788	31,055	2,117,027	2,238,000	Columbia
South Dakota	S.D.	1889	77,047	652,740	667,000	Pierre
Tennessee	Tenn.	1796	42,246	3,291,718	3,362,000	Nashville
Texas	Tex.	1845	263,644	7,711,194	8,468,000	Austin
Utah		1896	84,916	688,862	757,000	Salt Lake City
Vermont	Vt.	1791	9,609	377,747	385,000	Montpelier
Virginia ¹	Va.	1788	40,815	3,318,680	3,588,000	Richmond
Washington	Wash.	1889	68,192	2,378,963	2,540,000	Olympia
West Virginia	W. Va.	1863	24,181	2,005,552	1,947,000	Charleston
Wisconsin	Wis.	1848	56,154	3,434,575	3,578,000	Madison
Wyoming	Wyo.	1890	97,914	290,529	312,000	Cheyenne
District of Columbia	D.C.	1790 ²	69	802,178	861,000	Washington

¹ The original 13 states. ² Gross area represents land and water. ³ Organised.

* Alaska took its place as the 49th state in 1958.

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between 25° N. and 49° N. lat., and 69° W. and 125° W. long. The boundaries are the Atlantic Ocean on the E., the Gulf of Mexico and Mexico on the S., the Pacific Ocean on the W., and the dominion of Canada on the N.

AREA AND POPULATION. The estimated area of the continental U.S.A. is 3,022,387 sq. m., consisting of 2,974,726 sq. m. of land and 47,661 sq. m. of inland water. Non-contiguous ters. of the U.S.A. include the Ter. of Alaska (586,400

census the pop. of the continental U.S.A. is divided as follows: white, 134,942,028; Negro, 15,042,286; Amer. Indian, 343,410; Chinese, 117,629; Japanese, 141,768; other races, 110,240. Of the white pop., 124,780,860 were native born and 10,161,168 foreign born. Although the permitted quota is 154,657 immigrant aliens, a total of 208,177 immigrants entered the U.S.A. in 1954, some of these persons being in non-quota classes. (See also EMIGRATION; IMMIGRATION.)

DEPENDENCIES

<i>Dependency, etc.</i>	<i>Date of Acquisition</i>	<i>Area</i>	<i>Census Population 1950</i>	<i>Capital</i>
Alaska	1867 ¹	590,884	128,643	Juneau
Hawaii	1898	6,435	499,794	Honolulu
Panama Canal Zone	1903	554	52,822	
Puerto Rico	1898	3,435	2,210,703	San Juan
Guam	1898	205	59,498	Agaña
American Samoa	1898 and 1925	76	18,937	Pago Pago
Virgin Islands	1917	132	26,665	Charlotte Amalie (St Thomas)
Members of Armed Forces			301,595	

¹ Purchased.

sq. m.), the Ter. of the Hawaiian or Sandwich Is. (6423 sq. m.), and the following dependencies: the Panama Canal Zone (553 sq. m.), Puerto Rico (3435 sq. m.), Guam (206 sq. m.), the Virgin Is. (133 sq. m.) and Navassa Is. (2 sq. m.) Tutuila and other Is. of F. Samoa, including Swain's Is. (area 76 sq. m. in all), the Wake and Midway Is. (5 sq. m.) and various other Pacific Is., Kure Is., Palmyra, Kingman Reef, Cornwallis or Johnston Is., Howland, Baker, and Jarvis Is. (about 6 sq. m. in all). The Caroline Is. (500 sq. m.) and the Mariana and Marshall Is. (830 sq. m.) are administered under U.N. trusteeship. In addition, 2 Is. of the Phoenix Group, Canton and Enderbury, are administered jointly by the U.S.A. and Great Britain for common use as air stations. Total area of the U.S.A., including ters. and dependencies, is 3,628,130 sq. m.

States and Dependencies. Continental U.S.A. comprises 48 states and the Dist. of Columbia. Alaska, Hawaii, the Panama Canal Zone, Puerto Rico, Guam, Samoa, and the Virgin Is. are also U.S. possessions, and in addition the U.S.A. has the lease of a number of defence bases. The states and dependencies of the U.S.A., together with their pop. and caps. are shown on pages 332 and 333.

Population. According to the census of 1950 the pop. of the U.S.A. and Territorial possessions was 151,132,000 (including military forces overseas), an increase of 19,312,000 or 8·7 per cent over the findings of the previous census taken in 1940. An estimated figure of 165,248,000 in July 1952 shows a still further increase. According to the 1950

Cities. In the 1950 census it was found that 106 cities in the U.S.A. had a pop. of over 100,000. A list of these follows (the figure given in brackets denotes the pop. in 1880).

New York, New York	7,891,957 (1,911,698)
Chicago, Illinois	3,620,962 (503,185)
Philadelphia, Pennsylv.	2,071,605 (847,170)
Los Angeles, California	1,970,358 (11,183)
Detroit, Michigan	1,849,568 (116,340)
Baltimore, Maryland	949,708 (332,313)
Cleveland, Ohio	914,808 (160,146)
St Louis, Missouri	856,796 (350,518)
Washington, D.C.	802,178 (147,293)
Boston, Massachusetts	801,444 (362,839)
San Francisco, California	775,357 (233,959)
Pittsburgh, Pennsylvania	676,806 (235,071)
Milwaukee, Wisconsin	637,392 (115,587)
Houston, Texas	596,163 (16,513)
Buffalo, New York	580,132 (155,134)
New Orleans, Louisiana	570,445 (216,000)
Minneapolis, Minnesota	521,718 (46,887)
Cincinnati, Ohio	503,998 (255,139)
Seattle, Washington	467,591 (3,533)
Kansas City, Missouri	456,622 (55,785)
Newark, New Jersey	438,776 (136,508)
Dallas, Texas	434,462 (10,358)
Indianapolis, Indiana	427,173 (75,056)
Denver, Colorado	415,786 (35,029)
San Antonio, Texas	408,442 (20,550)

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Memphis, Tennessee	396,000	(33,592)
Oakland, California	384,575	(34,555)
Columbus, Ohio	375,901	(51,647)
Portland, Oregon	373,628	(17,577)
Louisville, Kentucky	369,129	(123,758)
San Diego, California	334,387	(2,637)
Rochester, New York	332,488	(89,366)
Atlanta, Georgia	331,314	(37,409)
Birmingham, Alabama	326,037	(3,086)
St Paul, Minnesota	311,349	(41,473)
Toledo, Ohio	303,616	(50,137)
Jersey City, New Jersey	299,017	(120,722)
Fort Worth, Texas	278,778	(6,663)
Akron, Ohio	274,605	(16,512)
Omaha, Nebraska	251,117	(30,518)
Long Beach, California	250,767	
Miami, Florida	249,276	
Providence, Rhode Island	248,674	(104,857)
Dayton, Ohio	243,872	(38,678)
Oklahoma City, Oklahoma	243,504	
Richmond, Virginia	230,310	(63,000)
Syracuse, New York	220,583	(51,792)
Norfolk, Virginia	213,513	(21,966)
Jacksonville, Florida	204,517	(7,650)
Worcester, Massachusetts	203,486	(58,291)
Tulsa, Oklahoma	182,740	
Salt Lake City, Utah	182,121	(20,768)
Des Moines, Iowa	177,965	(22,408)
Hartford, Connecticut	177,397	(42,015)
Grand Rapids, Michigan	176,515	(32,016)
Nashville, Tennessee	174,307	(43,350)
Youngstown, Ohio	168,330	(15,435)
Wichita, Kansas	168,279	(4,911)
New Haven, Connecticut	164,443	(62,882)
Flint, Michigan	163,143	(8,409)
Springfield, Massachusetts	162,399	(33,340)
Spokane, Washington	161,721	
Bridgeport, Connecticut	158,709	(27,643)
Yonkers, New York	152,798	(18,892)
Tacoma, Washington	143,673	
Paterson, New Jersey	139,336	(51,031)
Sacramento, California	137,572	(21,420)
Albany, New York	134,995	(90,758)
Charlotte, N. Carolina	134,042	(7,094)
Gary, Indiana	133,911	
Fort Wayne, Indiana	133,607	(26,880)
Austin, Texas	132,459	(11,013)
Chattanooga, Tennessee	131,041	(12,892)
Erie, Pennsylvania	130,803	(27,737)
El Paso, Texas	130,485	(736)
Kansas City, Kansas	129,553	(3,200)
Mobile, Alabama	129,009	(29,132)
Evansville, Indiana	128,636	(29,280)
Trenton, New Jersey	128,009	(29,910)
Shreveport, Louisiana	127,206	(8,009)

Baton Rouge, Louisiana	125,629	(7,197)
Scranton, Pennsylvania	125,536	(45,850)
Knoxville, Tennessee	124,769	(9,693)
Tampa, Florida	124,681	(720)
Camden, New Jersey	124,555	(41,659)
Cambridge, Massachusetts	120,740	(52,669)
Savannah, Georgia	119,638	(30,709)
Canton, Ohio	116,912	(12,258)
South Bend, Indiana	115,911	(13,280)
Berkeley, California	113,805	
Elizabeth, New Jersey	112,817	(28,229)
Fall River, Massachusetts	111,963	(48,961)
Peoria, Illinois	111,856	(29,259)
Wilmington, Delaware	110,356	(42,478)
Reading, Pennsylvania	109,320	(43,278)
New Bedford, Massachusetts	109,189	(26,845)
Corpus Christi, Texas	108,287	(3,257)
Phoenix, Arizona	106,818	
Allentown, Pennsylvania	106,756	(18,063)
Montgomery, Alabama	106,525	(16,713)
Pasadena, California	104,577	
Duluth, Minnesota	104,511	(3,483)
Waterbury, Connecticut	104,477	(17,806)
Somerville, Massachusetts	102,351	(24,933)
Little Rock, Arkansas	102,213	(13,138)
Utica, New York	101,531	(33,914)

GEOGRAPHY. Surface. The surface of the U.S.A. from E. to W. may be divided as follows: (1) the Atlantic Plain, which extends from the coast to the Appalachian system (formerly called the Alleghenies); (2) the Mississippi Valley and Great Central Plain, which extends from the Appalachian Mts W. to the Rocky Mts, an enormously fertile region about 1000 m. by 1000 m. in extent; (3) the W. Highlands; (4) the Pacific Slope, which extends from the Rocky Mts to the Pacific Ocean.

Mountains. The chief mt systems are the Appalachian ranges in the E. and the Rocky Mts (q.v.) in the W.

(1) The Appalachian system consists of very ant rocks, which were elevated in former ages to a great height, and then reduced by erosive forces to a broad lowland. More recent elevation is responsible for some of the present ranges, while others are remainders of the earlier movements which have restricted erosive forces. The surface of this region to-day is a series of parallel ranges divided by fertile valleys. There is no peak of marked elevation in the Appalachian region, the highest point being Mt Mitchell in N. Carolina, which reaches a height of 6684 ft.

(2) The Rocky Mt system is composed of comparatively recent formations, and in some parts elevation still continues. Many of the ranges are anticlinal, and many peaks rise to great heights. Vol-

canoes or extinct volcanoes are numerous. The U.S.A. Rocky Mt system extends from 36° N. to 49° N. lat., a distance of about 1200 m. The system is continued in Canada. The highest peak is Mt Whitney, 14,495 ft. in California. In the W. part of the S. Rockies lies the Great Basin of Colorado, which is extremely arid, has suffered much volcanic action, and is intersected by deep canyons cut by the rivers.

The W. of the highland region of the W. U.S.A. is bounded by the Pacific Mts. These consist of 3 ranges, the Sierra Nevada, the Cascade Range, and the Coast Range.

Coast. The E. coast of the U.S.A. continues the Continental Shelf of Canada. This shelf was at one period in the geological hist. of the country completely uncovered, and at another period the whole of the present coastal plain, as well as the present Continental Shelf, was submerged. The Continental Shelf practically disappears off Florida.

The riv. valleys which cross the coastal plain and the Continental Shelf are now partially submerged, and so give safe and deep harbours. From the N. boundary of the U.S.A., as far S. as Cape Hatteras, the coast is low and, especially N. of New York State, rocky, the coast of Maine eminently so. The coast of New Jersey, on the other hand, is sandy, and, farther S., off the Atlantic coast and also along parts of the coast of the Gulf of Mexico, there are numerous sand-spits with shallow channels, lagoons, and swamps. There are few good natural harbours here.

There is only one considerable indentation on the E. coast of the U.S.A., viz. Chesapeake Bay, which runs inland in a northward direction for more than 180 m., with an average breadth of about 15 m.

The Pacific coast of the U.S.A. has a very narrow Continental Shelf, and few bays or capes. The only considerable indentations are San Francisco harbour, which is deep and safe, and Puget Sound, between the State of Washington and British Columbia.

Rivers. The rivs. of the Atlantic Plain rise in the Appalachian system, and are comparatively short. In some cases they are too rapid to be of much value for navigation, but are valuable as supplying water power. The others almost without exception have good harbours at their mouths. The chief are: the Hudson (315 m.), the Delaware (410 m.), the Susquehanna (450 m.), the Potomac (285 m.), the James (340 m.), and the Savannah (450 m.). The Hudson is the most valuable for commerce, as it is connected by the New York State Barge Canal with Buffalo and the Great Lakes, while the Richelieu Canal connects it with Montreal. The Delaware 410 m. includes the E. branch. If the Potomac S. branch is included in its length the total is 415. The James begins at the confluence of the Cowpasture and the Jackson rivs., each 75 m. long. The Savannah (314 m.) is formed by the junction of the Tugaloo (45 m.) and the Seneca (50 m.).

The Great Central Plain is drained by

the Mississippi-Missouri riv. system, the basin of which covers half the area of the U.S.A., and is equal in area to about one-third the area of Europe. The Mississippi rises in Lake Itasca in Minnesota, at about 1500 ft. above sea-level. After flowing for about 100 m. in an easterly direction it turns S., and is joined by numerous tribes. The chief are: the Missouri, which enters the Mississippi just above St Louis; the Ohio, which joins the main riv. at Cairo; the Arkansas, the Wisconsin, the Illinois, and the Red R. The Mississippi (with the Missouri, its chief trib.) is 4814 m. long; the Missouri, 2464 m.; the Ohio, 1500 m.; the Arkansas, 981 m.

The Mississippi-Missouri has made a broad flood plain, varying in width from 30 to 60 m. This plain is subject to severe inundations, for it slopes very gently away from the riv. bed, which is in many parts of the riv. above the level of the surrounding plain contained by levees maintained by the gov. When these break great floods occur. The riv. carries a vast amount of silt, which it deposits at its mouth, forming a delta.

Other rivs. falling into the Gulf of Mexico are the Mobile and the Rio Grande. The latter (about 1885 m. long) forms the boundary between Texas and Mexico.

The rivs. flowing into the Pacific are comparatively short, owing to the nearness of the coast ranges to the sea. The Colorado R., 1400 m. long, flows into the Gulf of California, after crossing an arid plateau. It has cut for itself a deep canyon with almost perpendicular banks, in many places more than a m. high. The San Joaquin and the Sacramento Rs. unite and flow into the harbour of San Francisco; these and the Columbia, 1210 m. long, are the only important rivs. on the W. of the U.S.A.

Lakes. Of the Great Lakes of N. America Lake Michigan lies within the U.S.A., and the S. shores of Lake Ontario, Lake Erie, Lake Huron, and Lake Superior are U.S.A. ter. These lakes were formed by the action of the glacier which once covered the continent as far S. as the forty-second parallel, roughly speaking. They are remainders of much larger lakes and are of the utmost importance as waterways. They comprise the greatest inland body of fresh water in the world, and carry ships comparable to those of the ocean. New England has very many smaller lakes, which are also the result of glacial action. The largest lake of the U.S.A., apart from the Great Lakes, is the Great Salt Lake of Utah.

Climate. A country as large as the U.S.A. and one having such wide differences of elevation must necessarily have a climate of wide differences of temp. and of rainfall. The SE. States have almost a sub-tropical climate, without extreme variation between the winter and summer temps. The E. and central states are subject to much greater variations of temp., while the W. coast is less extreme in climate than are the other parts of the U.S.A. The rainfall is heaviest in Alabama, Mississippi, Gulf States, and on

the E. coast; it gradually decreases towards the W.; California and Colorado are dry, and the N. part of the W. coast has an abundant rainfall. The driest states are Arizona, Nevada, Montana, and New Mexico. The rainfall of the E. coast is steady and rather greater than that of England. The rainfall in the Gulf States is heavier and is chiefly monsoonal in character, falling mainly in the summer. The winds from the Pacific bring rain to the W. coast, but the Sierra Nevada Mts shut these winds off from the Great Basin in Nevada and Utah, which has an average yearly rainfall of less than 10 in. The climate of the Central Plain is rendered colder in winter owing to lack of shelter from the winds blowing from the N. The Central Plain and the New England States have heavy snowfalls in

still preserved in the Yellowstone dist. Other indigenous animals are the grizzly bear, which belongs to the Rockies, the Rocky Mt goat, the Rocky Mt sheep, the opossum, the prairie dog, the puma, the wild cat, coyote, and various kinds of deer. The fish include cod, halibut, mackerel, shad, and salmon. Many varieties of fresh-water fish are found in the lakes. The country is also noted for its great variety of bird life.

MINERALS. The U.S.A. is rich in almost every kind of mineral. There are 7 main coalfields supplying bituminous coal. These are: the Appalachian, the Central, the W., the Rocky Mt, the Michigan, the Richmond Basin, and the Pacific coast fields. The only important source of anthracite coal is Pennsylvania. The most productive iron mines are in the



A COTTON WORKER
OF GEORGIA



AN INDIAN OF TAOS,
NEW MEXICO



STEEL WORKER OF
PENNSYLVANIA

U.S. Information Service

winter, while perpetual snow lies on the summits of the Rockies and of the Coast Ranges.

Flora and Fauna. In their natural state the E. coastal plain and the E. highlands were covered with temperate forests. These have been largely cut down. The S. States (the Gulf States) have some sub-tropical forest trees which yield woods valuable in commerce. The W. coast forests are extensive, and are noted for the enormous size of some of their trees, which are mainly spruce, cedar, redwood, and Sequoia pine. The Central Plain was originally covered on the E. with mixed forest and grass-lands, which merged into grass lands without forests to the W. as the rainfall decreased. This dist. is now the great wheat and grass area. The Great Basin region has not much vegetation; what there is is mainly of a desert type, though where irrigation works have been successfully carried out this region has proved itself capable of supporting a luxuriant vegetation.

The Central Plains of the U.S.A. were once the haunt of the bison, but it is now almost exterminated, though herds are

neighbourhood of Lake Superior; the most valuable mines apart from these are in the S. Appalachian region. The Lake Superior dist. is rich also in copper, which is found almost in its pure state. Copper is also found in Arizona, Utah, Montana, and New Mexico. The E. States are rich also in petroleum and in natural gas. Pennsylvania is the largest producer of these commodities in the E., but there have been enormous finds in Texas, Oklahoma, and California. Zinc is found principally in Idaho, Oklahoma, New Jersey, and Kansas. The precious metals are mined principally in California, Colorado, Idaho, S. Dakota, Utah, Montana, Arizona, and Alaska. Large supplies of kaolin are found in the E. States; some sulphur is mined in Nevada and Utah. Salt is produced commercially in a number of States, especially Michigan, New York, Ohio, and Louisiana. Considerable quantities of marble are quarried in Vermont; sandstone is found in Ohio, Pennsylvania, Connecticut, and New York.

Gold production was as high as 6,000,000 Troy oz. in 1940 (value \$210m.), and thereafter declined steadily to under

1,000,000 troy oz. in 1946; in 1952 it was 1,652,704 troy oz. (value \$57,845,000). Silver production had a peak year in 1941 with over 71,000,000 troy oz. (value \$25m.); in 1952 it was 39,419 troy oz. (value \$35,676,000). The platinum group of metals (platinum, palladium, ruthenium, iridium, rhodium, osmium) are produced mainly from placers but also as a by-product of copper refining. Their ann. value in recent years is about \$1m. Production in a peak year (1938) was 45,000 troy oz., but in 1947 it had declined to 17,000 troy oz. Apart from the precious metals, the most recent figures for the production (in short tons, i.e. of 2000 lb.) and value of other non-ferrous metals are as follows: copper 855,000 (value \$210m.); zinc, 545,000 (value \$81m.); lead, 430,000 (value \$57m.).

In addition to this vast domestic production, imports of crude oil amounted to 242,000,000 barrels in 1954 at a value of \$2412m. The Philadelphia area is the chief refining centre, and the port of Philadelphia is the port of entry for crude oil imported from abroad. As a result of expansion in 1948, refineries are now able to cope with the domestic demand for petrol, kerosene, and light and heavy fuel oils. Coal production in 1954 (estimated), millions of short tons (value in millions of dollars), amounted to: anthracite, 27 (value 261); bituminous 392 (value 1889). Coke production was 78,836,857 net tons in 1953 (value \$1,156,562,004).

The value in millions of dollars of combined mineral products is as follows: in 1953 the total value was 14,381. Divided between metallic products, fuels



A FARMER OF
OREGON



A SUPERINTENDENT OF
SCHOOLS, NEW YORK



A MERCHANT-SEAMAN
OF NEW YORK

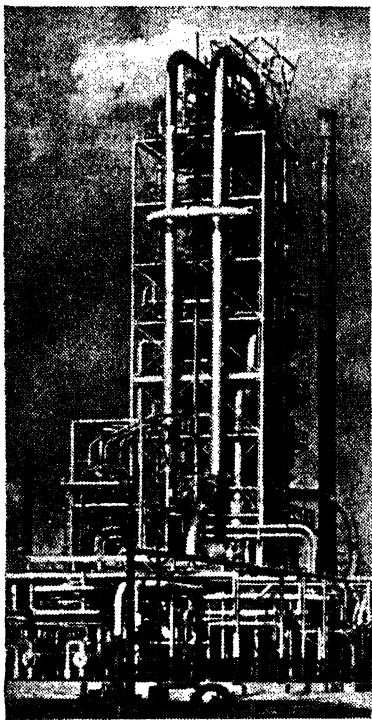
American Embassy, London

In 1954 production of copper was 1,656,000,000 lb. (value \$488,520,000); zinc, 410,000 short tons (value \$89m.); lead, 322,700 short tons (value \$88,420,000). Other important non-ferrous metals (with 1952 production) are antimony (4434 short tons), molybdenum (42,717 short tons), magnesium (25,000,000 lb.), and mercury (951,500 lb.). Iron ore is abundant in a number of states, particularly Minnesota, Michigan, and Alabama. Total output of iron ore was 117,994,769 gross tons in 1953 and 77,864,000 gross tons in 1954. In 1953 production of pig iron was 74,901,429 net tons, and in 1954, 57,965,548 net tons. Steel production declined from 111,609,719 net tons in 1953 to 88,311,652 net tons in 1954. Of the non-metallic mineral products, petroleum is produced in 26 states, the chief being Texas (over 900,000,000 barrels annually), California (300,000,000), Louisiana (246,000,000), Oklahoma (186,000,000), and Kansas (119,000,000). In 1954 production of crude oil was 2,257,119,000 barrels, of natural gas (liquid), 302,698,000 barrels, of natural gas, 9,426,509,000,000 cub. ft.

(i.e. coal, petroleum, natural gas, and liquid natural gas and allied products), and non-metallic (excluding fuels), the values are as follows (1953): metallic 1796, fuels 10,249, other non-metallic 2336.

AGRICULTURE. The 1950 census showed that nearly 60 per cent of the total land area of the continental U.S.A. is farmed, i.e. 1,158,565,852 ac., comprising 5,382,162 farms. The number of farms has decreased since 1930, but the acreage farmed has grown from 968,771,000 ac. in 1930 to the present figure. Since 1930 output has increased by about a quarter as the result of improved farming methods, but the long-term fertility of the soil may have been impaired. The value of farm lands and buildings has fluctuated, being (in millions of dollars) 48 in 1930, 34 in 1940, and about 75 in 1950. In 1954 it was estimated that 21,890,000 people were engaged in farming in the U.S.A. (31,614,269 in 1900). Agriculture is still, however, the largest single industry in America, employing approximately 13.5 per cent of the working pop. Wheat, oats, barley, and corn are the chief cereals

grown. Wheat is grown chiefly in Washington, Minnesota, Indiana, N. and S. Dakota, Ohio, and Oregon. Oats and barley are grown also in California. Corn is largely grown for fattening cattle, chiefly in Kansas, Nebraska, Iowa, Illinois, Missouri, Indiana, and Ohio. Rice is grown in the swampy parts of



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OIL REFINING: 'TOPPING HEATER'

Louisiana and Texas. Tobacco is grown principally in Kentucky, S. Carolina, N. Carolina, Virginia, Georgia, and Tennessee. Sugar is grown in Louisiana, but beet sugar also is manufactured from beets grown in Michigan, Nebraska, Colorado, Utah, and California. Cotton is very largely grown in the SE. part of the country. There are 2 kinds, the 'sea-island' cotton, which has a long thread and is grown on the is. and coasts of Georgia, S. Carolina, and Florida, and the 'upland' cotton, which has a short thread. This is grown inland in the SE. states. The production in 1954 was 13,569,000 bales of 500 lb. each. The leading cotton state is Texas; others are

Mississippi, Arkansas, Alabama, Georgia, S. Carolina, Louisiana, N. Carolina, Oklahoma, and Tennessee. Flax is grown mainly for its seed. The chief centre for it is Oregon. The production in 1954 of the prin. crops was as follows (in millions of bushels): corn (maize), 2964; oats, 1500; wheat, 970; potatoes, 355; barley, 370; soya beans, 343; sorghums, 204; rice, 59; rye, 24; flax seed, 41.5; buck-wheat, 31. Production of cotton was 13,569,000 bales, and of cotton-seed 5,568,000 short tons. Tobacco production was 2,200,134,000 lb. Over 104,380,000 tons of cultivated hay were cut. Fruit and nuts form a large part of the ann. produce; figures for 1954 for the chief fruits are (in millions): apples, 104 bushels; peaches, 61 bushels; pears, 30 bushels; grapes, 3 tons; oranges, 141 boxes; grapefruit, 46 boxes; lemons, 15 boxes; strawberries, 12 crates. During the same year production of sugar cane was 6,940,000 short tons. Sugar beet amounted to 14,027,000 short tons.

Stock Farming. The 1950 census showed there were in the U.S.A. 7,781,000 horses and mules, 77,963,000 cattle, of which 23,853,000 were milk cows, 26,182,000 sheep, and 58,852,000 hogs. Estimates for 1955 showed a decline in hogs and horses and mules, but an increase in cattle. Figures (with value in millions of dollars) were: 4,551,000 horses and mules (horses value 165, mules value 90), 95,433,000 cattle



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GENERAL AGRICULTURE IN THE U.S.

An automatic cotton picker dumps a load into the wagon at the end of a row.

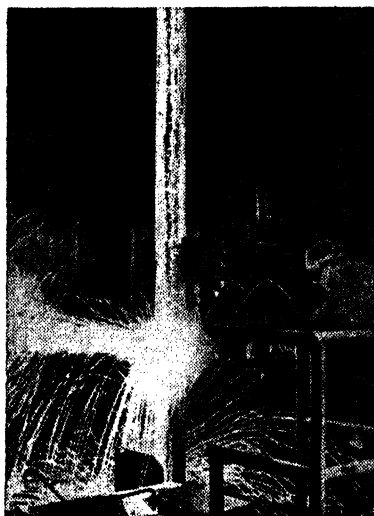
(value 8478), 24,408,000 milk cows (value 3252), 26,979,000 sheep (value 402), 55,002,000 hogs (value 1684). Poultry on farms in 1955 numbered 447,310,000, and egg production for 1954 was 65,375,000,000.

Forestry. An estimate made in 1945 showed that forest land occupied about 624,000,000 ac., or about one-third of the area of the continental U.S.A. Of this forest area, 461,044,000 ac. represented commercial forest, comprising saw-timber

areas 205,176,000 ac. of second or older growth, pole-timber areas 95,013,000 ac., seedling and sapling areas 85,552,000 ac., and areas poorly stocked or denuded 75,303,000 ac. Of the commercial forests the Federal Gov. owned 88,957,000 ac., state, co., or city 27,114,000 ac., and private companies 344,973,000 ac. The national Forest Service, however, administers both commercial and non-commercial forest land, divided into 152 national forests in 40 states and in Alaska and Puerto Rico, the total extent (1948) being nearly 180,000,000 ac. The W. and S. states supply Douglas and White fir, redwood, ponderosa and sugar pine, hemlock, and spruce; the E. states, yellow and white pine, oak, red gum, yellow poplar, maple, hemlock, beech, and cypress. Timber production in 1953 was 36,742,000,000 board ft. By-products from forestry include turpentine, tar, resin, and molasses made from wood sugar for poultry food.

MANUFACTURES AND INDUSTRY. Industrial production in the years since the Second World War is nearly a hundred per cent higher than in 1938-9. The following figures, in millions of dollars, are for 1954. The chief durable manufs. are iron and steel (1442), machinery other than electrical (1796), electrical machinery (1374), transportation equipment other than automobile (814), automobiles and equipment (2319), non-ferrous metals and their products (787), timber and lumber products (286), stone, clay, and glass products (883). Non-durable manufs. include textiles (345), chemical products (2283), rubber products (393), petroleum and coal products (52), food and kindred products (1817), tobacco (329), paper and allied products (970), printing and publishing (357), and leather products (116). Industry is widespread, the chief manufacturing centres being New York, Newark, and New Jersey, Chicago, Detroit (centre of the motor-industry), Philadelphia and Camden, Pittsburgh, Boston, Cleveland, Buffalo, St Louis, Los Angeles, San Francisco, and Oakland, Baltimore, Milwaukee, Cincinnati, Youngstown, Bridgeport, New Haven, and Waterbury. The chief iron manufs. are in Pennsylvania, Allegheny co. being the most important dist., and Pittsburgh the most important tn. This state manufs. mainly steel for bridges, frames of buildings, rolled steel, nails, etc. Tools and cutlery are manufactured in the New England States, agric. implements in Illinois and Connecticut. Machinery is largely made in Chicago, New York, Pittsburgh, Philadelphia, and Cleveland. Steel shipbuilding goes on at Philadelphia, San Francisco, and other ports. Cottons are manufactured, mainly on the E. Coastal Plain. The atmosphere is here sufficiently damp for the thread, and the line of falls by which the rivs. descend from the Appalachian hills to the plain supplies abundant water power for the working of the machinery. The S. states, particularly N. Carolina, have begun the manuf. of cotton textiles and are displacing New England in this regard.

Woollens are manufactured mainly in the New England states, and in Philadelphia and New York. The manufs. include men's suitings, women's dress goods, carpets, and felts. Silk is manufactured in New Jersey, New York, and Pennsylvania. Food manufs. and industries are important. They include the preparation of cattle, sheep, and pigs for export. Chicago, Omaha, and Kansas City are the largest centres for this industry; from



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THE STEEL INDUSTRY

Cutting the moving steel bar at the first continuous casting tower in Beaver Falls, Pennsylvania. The oval bar, emerging from the mould, is cut into 15-ft lengths by an automatic acetylene cutting torch.

it arises the leather-making industry, whose chief dists. are New York, Philadelphia, and Worcester in Massachusetts. Flour milling is carried on mainly at Minneapolis, St Paul, and at Superior. Fruit and salmon are canned very largely on the Pacific coast. Other important manufs. are glassware, silverware, and hardware, asbestos products, druggist preparations and patent medicines, perfume and cosmetics, cigarettes, musical instruments, and fertilisers. The table shows general statistics for major industry groups in 1953.

To meet the high cost of living, wages and salaries, by European standards, are generally high. Amer. labour is organised into unions which, unlike most European bodies, accept in principle the capitalist basis of society. Since the 1880s, Amer. industries have been increasingly

United States

340

United States

dominated by large corporations. Amer. industry relies to a large extent on electricity. In 1953 industries produced a total of 514,169,000,000 kwh. of which industry used 404,552,000 (fuel) and 109,617,000 (hydro-electric), and electric utilities used 337,431,000 (fuel) and 105,233,000 (hydro-electric).

COMMERCE. The extent of internal trade is shown by the fact that retail

and eggs, 100, meats and edible fats, 149; semi-manufs. and finished manufs., 11,552, the chief commodities being electrical, industrial, and agric. machinery, 2276; automobiles, including parts and accessories, 1035 (including 173,000 passenger motor cars and 184,000 trucks and coaches); chemicals and related products, 974; iron and steel-mill products, including scrap, 510

MANUFACTURES: GENERAL STATISTICS FOR MAJOR INDUSTRY GROUPS

Source: Bureau of the Census, 1953 Annual Survey of Manufacturers

Industry	All Employees		Production Workers			Value Added by Manufacture ³
	Number (average for the year) ¹	Salaries and wages, total	Number (average for the year) ¹	Man-hours, total	Wages, total	
Food and kindred products	1,455,110	5,266,485	1,069,696	2,160,257	3,435,455	11,927,510
Tobacco manufactures	95,442	253,411	87,176	105,704	213,310	987,073
Textile mill products	1,158,471	3,455,295	1,060,398	2,085,600	2,910,348	5,411,769
Apparel and related products	1,227,161	3,357,941	1,105,498	1,994,996	2,652,212	5,414,627
Lumber and products, excluding furniture	719,900	2,086,794	658,352	1,235,784	1,803,186	5,500,524
Furniture and fixtures	360,842	1,259,319	309,910	629,451	972,725	2,046,805
Paper and allied products	533,312	2,150,228	441,608	949,567	1,646,492	4,463,237
Printing and publishing industries	780,332	3,386,615	474,006	924,397	2,013,924	5,916,432
Chemical and allied products	768,425	3,400,132	536,124	1,093,789	2,102,610	9,320,348
Chemical and coal products	229,294	1,139,577	175,770	350,552	820,992	2,795,573
Rubber products	269,780	1,140,019	218,853	432,359	866,215	2,021,443
Leather and leather products	375,364	1,098,806	338,355	629,498	896,502	1,711,066
Stone, clay, and glass products	608,439	1,948,876	450,868	878,011	1,538,450	3,752,912
Primary metal industries	1,287,755	6,001,743	1,102,455	2,262,974	4,867,368	11,603,954
Fabricated metal products	1,117,600	4,785,443	915,614	1,884,051	3,555,086	8,143,060
Machinery, except electrical	1,891,235	7,875,812	1,307,312	2,743,740	5,686,694	13,380,729
Electrical machinery	1,095,862	4,424,751	851,443	1,702,904	3,077,463	7,876,186
Transportation equipment	1,911,708	8,986,838	1,629,924	3,154,956	6,731,078	14,534,323
Instrument and related products	285,469	1,232,467	212,192	433,752	823,564	2,169,354
Miscellaneous manufactures ⁴	845,544	3,232,056	656,051	1,307,617	2,360,408	5,271,811
Administrative and auxiliary ⁴	399,892	2,097,552				
ALL INDUSTRIES, TOTAL	17,082,881	68,590,060	13,500,934	27,065,569	48,979,102	121,659,136

¹ Based on reported employment totals for the pay roll periods ended nearest 15 Mar., May, Aug., and Nov.

² Value of products less cost of materials, supplies, fuel, electric energy, and contract work.

³ Includes privately owned and/or operated establs. Gov. owned and operated establs. are excluded from the ann. survey.

⁴ Administrative office and auxiliary unit employment is based on the number of employees reported as of Mid-Mar. under the Old-Age and Survivors Insurance programme.

sales amounted during 1954 to \$170,664m., and wholesale sales to \$109,294m. External trade has shown an excess of exports over imports since 1880. The prin. countries to which U.S. goods are exported are (in order of value of trade): Canada, the U.K., France, Argentina, Brazil, Mexico, Germany, Belgium, and Luxembourg. Those from which goods are imported are (in the order of value of trade): Canada, Cuba, Brazil, Brit. Malaya, India, Mexico, and the U.K. During 1954 the value (in millions of dollars) of exports, divided into economic classes with the value of the chief commodities in each class (and quantity shown in brackets) was as follows: crude materials, 1896, including coal, 304 (34,000,000 short tons); cotton, 788 (4,430,000 bales); tobacco, 303 (468,000,000 lb.); petroleum, 45 (13,599,000 barrels); crude and manufactured foodstuffs, 1500, including wheat and flour, 427 (232,000,000 bushels); fruit and vegetables, 272, dairy products

(4,376,000 tons); petroleum products, 386 (including 8,428,000 barrels of motor fuel and gasoline and 8,894,000 barrels of lubricating oil).

During 1954 the value (in millions of dollars) of imports, divided into economic classes with the value of the chief commodities in each class (and quantity shown in brackets) was as follows: crude materials, 2412, including rubber, 262 (1,337,000,000 lb.), wool, 223 (214,000,000 lb.), petroleum, 544 (242,000,000 barrels), undressed furs, 67, non-ferrous ores, 854, oilseeds, 62 (815,000,000 lb.), hides and skins, 53 (120,000,000 lb.), tobacco, 83 (106,000,000 lb.); foodstuffs, crude and manufactured, 3315, including coffee, 1486 (2,261,000,000 lb.), cane sugar, 409 (7,484,000,000 lb.), fruit, nuts, and vegetables, 225, cocoa or cacao beans, 252 (519,000,000 lb.), wines and spirits, 147; semi-manufs., 2310, including non-ferrous metals, 854, wood pulp, 252 (2,051,000 short tons), gas and fuel oil, 254 (137,000,000 barrels), vegetable oils, 59

(358,000,000 lb.); finished manufs., 2195, including paper, 637, newsprint, 596, burlaps, 71 (416,000,000 lb.), timepieces, 67, textiles, 374, passenger automobiles, 45 (28,000 motor cars).

COMMUNICATIONS. Shipping. The tonnage of vessels entered and cleared at U.S.A. ports each year is about 190,000,000 net tons, of which over 100,000,000 represents Amer. shipping. New York is the



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AUTOMOBILE ASSEMBLY LINE AT CHRYSLER CORPORATION

External Trade in the United States of America. The following table shows value in millions of dollars for selected years:

<i>Year</i>	<i>Exports</i>	<i>Imports</i>
1840	123	98
1860	333	353
1880	835	667
1900	1,394	849
1910	1,744	1,556
1920	8,228	5,278
1930	3,843	3,061
1932	1,611	1,323
1939	3,117	2,318
1941	5,147	3,345
1943	12,965	3,381
1944	14,259	3,928
1945	9,806	4,159
1944	14,259	3,928
1945	9,806	4,159
1946	9,739	4,942
1947	14,430	5,756
1948	12,653	7,123
1949	12,000	6,622
1950	10,275	8,852
1951	15,032	10,967
1952	15,200	10,717
1953	15,773	10,873
1954	15,076	10,207

chief seaport, over 40,000,000 tons of shipping being entered and cleared annually and over 100,000,000 tons of cargo handled. Other important ports on the N. Atlantic coast are Philadelphia, Boston, Portland, Providence, and Bridgeport: total tonnage entered and cleared annually, 12,000,000 tons. On the S. Atlantic coast the chief ports are Norfolk, Baltimore, Charleston, and Savannah: total tonnage, 41,000,000 tons. On the Mexican Gulf the chief ports are New Orleans, Galveston, Tampa, Mobile, and Port Arthur: total tonnage, 35,000,000 tons. On the Pacific coast the chief ports are Los Angeles, San Francisco, Seattle, Portland, and San Diego: total tonnage, 21,000,000 tons. Of the Great Lakes ports, Duluth (at which over 50,000,000 tons of cargo are handled annually), Toledo, Chicago, and Cleveland are the chief. Another important port is Houston, Texas, the Houston Ship Channel, 50 m. long and 30 ft deep having been completed in 1925. Houston ranks as the fourth seaport after New York, Philadelphia, and Baltimore, over 30,000,000 tons of cargo being handled annually at each of these ports. Excluding vessels on the Great Lakes and inland waterways, the U.S. merchant marine comprised

(1955) approximately 1162 sea-going ships of 1000 gross tons or over.

Road, Rail, and Air Transport. Road mileage outside urb. areas is estimated (1953) at 3,012,520 m., of which 89,990 m. are under Federal control, 600,518 under State control, and 2,322,012 under local control. Under the Federal Aid Highway Act of 1948, increased Federal aid was given to a system of primary roads extending over 232,000 m. This included the National Inter-State Highway system covering over 40,000 m., consisting of about 37,000 m. of main rural roads, the remainder being urb. and by-pass roads. The secondary road system receiving Federal aid extended over 378,000 m. (1949), new construction during 1948 amounting to some 27,000 m. A section of the Pan-Amer. Highway, to which the U.S., Mexican, and Central Amer. govs. contribute, runs through the U.S.A. from Nuevo Laredo on the Mexican border to Panama City, about 3260 m. The Highway Act of 1948 authorised an ann. expenditure of \$450m. on roads.

The first railway projected was to run from Baltimore linking the coast with the Ohio valley (1831). In succeeding years a number of railways came into existence over short distances between neighbouring towns. By Act of Congress, the Union Pacific Railroad (q.v.) was chartered in 1862. By the end of the cent. about 167,000 m. of railway were in operation. The mileage has since been increased to over 224,000 m. (1949), but by 1953 had declined to 221,758. During 1948 and 1949 considerable capital improvement was carried out, involving an ann. expenditure of over \$1000m. 1947 was a record year for the value of freight traffic with a tonnage of 1,613,000,000, carried over 657,878,000,000 ton-m. In that year also 706,000,000 passengers were carried over 46,000,000,000 passenger-m. In succeeding years there has been a decline both in passenger and freight traffic as a result of increased competition from other forms of transport.

Air transport over continental U.S.A. is conducted by 33 companies, of which 19 operate trunk lines and the remainder feeder lines. Of these 19 companies, 10 also operate overseas and international lines, while there are a further 4 companies operating overseas and international lines only. On the domestic airlines over 554,433,000 m. were flown in 1954 with over 31,784 passengers, and on the overseas and international lines some 124,897,000 m. with over 3,406,000 passengers. The commercial airlines have (1954) nearly 1600 aircraft in commission.

Telegraphs and Telephones. These are controlled by private companies, the former largely by Western Union Telegraph with nearly 30,000 offices, and the latter by American Telephone and Telegraph, which has organised the Bell Telephone System, operating over 50,869,000 telephones out of a total of 50,373,000 for all systems. Post offices number 32,076 (1955), of which 3613 are Class 1. Air mail is carried over 33 domestic and overseas airlines, 62,759,000

ton-m. being flown in 1955. The 2 chief cable companies are the W. Union and Commercial Cable, both of which also own cable lines to Europe.

RELIGION. The religious census taken in 1936 showed that there were in the U.S.A. 256 religious bodies, with 199,302 churches and a total membership of 55,807,366. In 1955 it was estimated that the continental U.S.A. contained 254 religious bodies, with 300,056 churches and a membership of 97,482,611. Of the various Protestant denominations, those with over 1,000,000 membership were: Baptists, 1,803,645; Methodists, 1,803,645; Lutherans, 7,117,906; Presbyterians, 3,837,101; Protestant Episcopalians, 2,757,744; Disciples of Christ, 1,822,377; Congregational Christian Church, 1,310,572; Latter-Day Saints, 1,438,428. Other Protestant bodies included the Evangelical Reformed Church, 761,325; and the Evangelical United Brethren, 746,206. The Rom. Catholic Church was the largest single church, with 38,023,977 (1958) members; the Eastern Orthodox Church had 2,808,872 members. There were 5,500,000 Jews.

EDUCATION. Illiteracy among the pop. aged 14 or over decreased from 3.1 per cent in 1940 to 2.5 per cent in 1952. Illiteracy is higher among the non-white pop., being 11 per cent (1947), among non-white aged 14 or over and 32.4 per cent among non-white aged 65 or over. Each state has its own laws for compulsory school attendance up to age 14 or 16, and exercises control in conjunction with the local authorities. According to the 1954 estimates 50 per cent of the pop. between the ages of 5 and 30 was attending school, college, or other educational institution, numbering 36,083,000 persons. There are nearly 200,000 elementary and secondary schools, including nearly 24,000 public high schools. Many higher educational institutions receive State grants, and most are run on the basis of co-education. There were in 1951-2 some 1850 univs., senior colleges and professional, technological, and other higher educational institutions, embracing in all nearly 2,500,000 students of both sexes and over 100,000 teachers. Harvard and Yale bear most similarity to Oxford and Cambridge, on which they are consciously modelled to some extent. Among the most famous colleges for women are Vassar, Wellesley, and Smith. Most Amer. univs., however, are co-educational. See also RACIAL SEGREGATION IN U.S. SCHOOLS.

FEDERAL CONSTITUTION AND STATE GOVERNMENTS. The Federal Constitution dates from 17 Sept. 1787. Its framers used their experience or knowledge of the working of the Brit. constitution, and adopted both the spirit and machinery of that constitution. The Amer. constitution contains 7 original and 21 amending articles, and entrusts the gov. of the nation to 3 separate authorities: the Legislature, the Executive, and the Judiciary. Article I vests the legislative power in a Congress consisting of a Senate together with a House of Representatives, and prescribes the qualifications of

senators and representatives. The representatives are chosen every second year by the electors of the different states. The House of Representatives consists of 435 members, the number of each state's representatives being allotted in proportion to its pop., the present average being 1 member for approximately 300,000 persons. Two senators chosen by the electors represent each state for a term of 6 years, one-third of the Senators being elected every 2 years. As in the case of the Brit. Parliament, each House determines the rules of its proceedings, adjudges disputed elections, and punishes members for misconduct. A Bill becomes law on passing both houses, provided the president approves and signs it. If he returns the bill, which he may do, with his objections, the House of origination may proceed to reconsider it, and if, on reconsideration, two-thirds of that House agree to pass the bill, they may send it to the other House, together with the president's objections; if approved by two-thirds of that House it becomes law. A bill not returned by the president within 10 days after presentation automatically becomes law, unless Congress, by adjourning, prevent its return. The president has the power, with the advice and consent of the Senate, to make treaties, provided two-thirds of the senators present concur. All revenue bills must originate in the House of Representatives, but the Senate may propose or concur with amendments. Congress must assemble at least once annually. The vice-president, who holds office for 4 years, is *ex officio* president of the Senate, but votes only on an equality of division. He becomes president, in case of the death or resignation of the latter, for the unexpired portion of the presidential term. Section 8 of Article I, which specifies the powers of Congress, is the vital part of the constitution. Beyond those powers Congress may not go, and the courts are made the ultimate arbiters on the constitutionality or otherwise of any law of Congress. (See CONGRESS OF THE UNITED STATES.)

By the amending Articles XIV and XV, additional powers are given for the protection of citizens against unjust or discriminating legislation by any state. The prin. remaining clauses of Article I forbid the grant of titles of nobility, and prohibit any state from making treaties or exercising other powers vested in Congress, or from passing *ex post facto* (or retro-active) laws.

Executive power is vested by Article II in the president, who holds office for 4 years. He is elected by the Electoral College, the members of which are appointed by each state in numbers equal to the number of representatives and senators returned to Congress by the state. No person except a natural-born citizen is eligible as president nor is any one eligible unless he be at least 35 years of age, and have been 14 years resident in the U.S.A. He is commander-in-chief of the Army and Navy, and of the militia in the service of the Union. Thirty-four men have held the office.

Article III provides for the judicial power, and gives the courts power to adjudicate on all matters touching the constitution. Article IV provides for the admission to the Union of new states, and guarantees to every such state a republican form of gov. Article V provides the mode of amending the constitution as follows: whenever two-thirds of both Houses deem it necessary Congress must propose amendments, or, on the application of the legislatures of two-thirds of the sev. states, call a convention for proposing amendments; and such amendments are effectual as part of the constitution if ratified by the legislatures of three-fourths of the sev. states, or by conventions in three-fourths of the states, according as one or other mode of ratification be proposed by Congress. Article VI makes the constitution the supreme law of the land, while Article VII provides for the ratification of the constitution. The amendments to the federal constitution comprise 21 additional articles. The prin. of these amendments guarantee religious freedom and freedom of speech; prohibit slavery, excessive bail, excessive fines, and the infliction of cruel punishments; maintain the popular right to bear arms; prohibit quartering of soldiers in private houses in time of peace; give a person accused of crime the right to a speedy trial; preserve the right of trial by jury in all cases where the value in controversy exceeds \$20; regulate the mode of balloting for the presidential elections; and guarantee the privileges and immunities and prescribe the status of citizens of the U.S.A. The eighteenth amendment (1919) made prohibition (q.v.) of liquor a federal concern, and was repealed by the twenty-first Amendment (1933). The nineteenth Amendment (1920) admitted women to the franchise and gov., and the twentieth (1933) fixed, *inter alia*, the day and time on which the terms of president and vice-president and also senators and representatives shall end. (On the constitution see further Lord Bryce (q.v.) *American Commonwealth*, 1911.) It is to be noted that the constitution does not purport to be a complete scheme of gov., but presupposes the existence of states' govts., whose powers comprise the residuum of legislative functions over and above the common or national matters vested expressly in Congress. Yet, as Lord Bryce points out, there are strange omissions to be found among the restrictions on state powers. The significance of these omissions is that the authors of the constitution evidently had no desire for general uniformity of states' govts. or institutions, their main object being 'to secure the national Gov. against encroachments on the part of the States, and to prevent causes of quarrel both between the Federal or State authorities and between the several States.' Nevertheless, the different states have tended almost to an excess of uniformity, and their legislatures have evinced little desire for experimental changes in their institutions. Each of the 48 states has its own constitution,

deriving its authority solely from the people of each state. Admission into the Union is granted by special Act of Congress. Each state has an elected governor and other executive officers, a legislature of 2 houses, and a judiciary. The powers of both Houses are co-ordinate, though in some states money bills must originate in the House of Representatives. The states' senates have powers similar to those of the Federal Senate. Sessions are generally biennial; the governor has the right to summon an extraordinary session, but not to adjourn or dissolve. The governor is elected by the direct vote of the people for a term varying from 1 to 4 years. In all but 2 states he has a veto on legislation, which may, however, be rendered nugatory by an adverse vote of the 2 Houses. In some 3 or 4 states the Federal Gov. prescribes the form of the local legislature and the president himself appoints the territorial governor and other important officials. The Dist. of Columbia (q.v.) is the seat of the Federal Gov.

DEFENCE. In accordance with the National Security Act of 1947 the armed forces were unified under a secretary of national defence with cabinet rank, under whom the Army, Navy, and Air Force are organised in 3 separate Depts., each having a secretary at the head, a civilian but not holding cabinet rank, with 2 assistant secretaries. Defence is co-ordinated by the National Security Council, of which the members are the president as commander-in-chief, the secretary of state, the secretary of defence, the secretaries of the 3 service depts., and the chairman of the National Security Resources Board. The secretary of defence, the 3 departmental secretaries, and the chiefs of staff also form a War Council. Subject to the authority of the president and the secretary of defence, the armed forces are directed by the Joint Board of the Chiefs of Staff. See the separate articles UNITED STATES AIR FORCE; UNITED STATES ARMY; UNITED STATES NAVY.

LAW. Strictly there is no Amer. law in the sense of a common law of indigenous origin, and the laws of the constituent states rest at bottom on the Eng. common law as it existed in the early 17th cent. The only notable exceptions are to be found in Louisiana and New Mexico, i.e. in ter. formerly subject to France or Spain. These latter states derive much of their civil law from France and Spain, and thus, remotely, from the principles of Rom. law. Nor, except within a sphere constitutionally defined, is there a national supreme tribunal to unify legal doctrine. On the other hand, while there is no common law of the U.S.A. as a sovereign state, each state has its own common law unfettered except by the provisions of certain articles of the federal constitution; and even these provisions do not necessarily conduce to unity of law except the clause requiring that full credit shall be given in each state to the public Acts and judicial proceedings of every other state, which to some extent

operates to unify doctrines respecting the conflict of laws. Penalties vary from state to state: e.g. not all states award capital punishment. It is also conceivable that the decisions of the lower federal courts that exist in every state and those of the Supreme Court tend to regularise judicial doctrine, especially in the field of federal commercial law which the states generally follow voluntarily (*see* LAW MERCHANT). In the early decades of this cent., however, the unification of law in America was assisted by the Amer. Bar Association in editing uniform Acts for adoption by all the states, and these Acts, together with a great body of judicial tradition, and much legislation governing the standards to which the Amer. people, irrespective of state, commonly conform, tend to modify the general assumption that, technically, there is no *corpus juris* or body of unified Amer. law. The ultimate safeguard of private rights is to be found in the guarantees in the fourteenth amendment of the federal constitution (1868) which resulted from the Civil war. One of the provisions of this Amendment is that no state shall deny to any person within its jurisdiction the equal protection of the laws; another, equally fundamental, is that no state may deprive a person of life, liberty, or property otherwise than by due process of law. These guarantees, together with that safeguarding the sanctity of contracts, decisively altered the relation between the state and federal tribunals and inaugurated a new era in the legal development of the nation; for issues depending on these guarantees have made the federal courts the agents of the social legislation arising out of the economic and industrial conditions developed since the Civil war (*see* SHERMAN ANTI-TRUST ACT). Regarding public law, the Supreme Court is absolutely supreme in its power to decide in cases of conflict between the federal authority and the state authorities. The constitution estab. the federal courts, whose jurisdiction extends to all cases arising out of the constitution, including those of an international character, whether between the states or between the U.S.A. and any other state in the world; and it also estab. a Supreme Court, which is a final court of appeal in these cases. This makes that court the ultimate interpreter of the constitution and places the judicial dept. above any legislation (within the limits of the constitution) whether federal or state.

The Federal Gov. maintains courts to try crimes against the U.S.A. and civil actions brought by the gov., or which arise out of the constitution, treaties, or laws of the U.S.A. relating to such subjects as admiralty, banking, patents, and taxation. The federal courts also have jurisdiction in cases between citizens of different states and between those of a state and a foreign state. The judges of all Amer. courts hold office during good behaviour, and may retire at 70 with full pay after 10 years' service. The Supreme Court at Washington consists of a chief justice and 8 associate justices, with

original jurisdiction in cases affecting ambassadors or where a state is a party to the suit, and with appellate jurisdiction from inferior federal courts of the states. The U.S. courts of appeal deal with appeals from district courts, and consist of the justice of the Supreme Court for the circuit and all the circuit and district judges within the circuit. There are 93 dist. courts, served by 200 dist. court judges. Those are the lowest of the federal courts, and, besides civil cases, they may try all criminal cases arising under the federal laws, including capital crimes. The whole country is divided into 10 circuits, each with a circuit court of appeal under the chief justice or an associate justice. Cases from inferior courts are usually heard in these appeal courts and then in the Supreme Court on a writ of *certiorari* (q.v.), but in certain cases, as when a decision is adverse to the constitutionality of an Act of Congress (see *under ACT*), the appeal may go to the Supreme Court direct. There are also various special courts with jurisdiction in customs, patents, and taxation cases. These are the court of claims, the U.S. customs court, the tax court, and the courts of customs and patents appeals. The state courts try all civil and criminal cases arising under state laws, but decisions of the courts of last resort as to the validity of treaties or on constitutional issues are subject to review by the Supreme Court. The lowest courts are those of justices of the peace; there are also municipal and police courts in many towns and cities with power to commit for trial on criminal charges or to try civil cases involving small amounts of money. See also APPEALS IN U.S.A.; BAR ASSOCIATION, AMERICAN; CRIMINAL LAW—United States; JUDGE—Judges in the U.S.A.; LEGAL EDUCATION; POLICE—Police Courts; STATE OR DISTRICT ATTORNEY (also ATTORNEY-GENERAL).

FINANCE. *Federal.* There has been a National Ann. Budget System and an Independent Audit of Gov. Accounts since 1921. (For U.S. revenue 1947–54 see *under PUBLIC REVENUE*. See also *under PUBLIC DEBT*.) In 1954–55 nearly 50 per cent of the budget was assigned to national defence; over 10 per cent to interest on the national debt and refunds owing under the tax laws; over 16 per cent to war veterans' benefits, thus leaving slightly over 20 per cent for all remaining expenditure.

SOCIAL SECURITY. The Social Security Act of Aug. 1935, since amended, makes provision for a system of old age, survivors', and unemployment insurances, organised by the Federal Gov. In 1949 further legislation increased the social security coverage to include a total of some 46,000,000 persons. Federal grants are made to the states for welfare services and public assistance. In 1946 the Social Security Administration replaced the Social Security Board: in this body is vested the Federal responsibility for these programmes. In addition, there are state insurance schemes which differ in

their scope and operation from state to state. See also NEW DEAL.

HISTORY. *Colonial America.* It is probable that the E. coast of N. America was discovered in AD 1000 by Leif Ericsson and his band of Norsemen. They planted a colony in Greenland and in 'Vinland,' probably some place on the coast of what is now New England. But they left no traces, for the colonies perished and the memory of them died out. It was left to Christopher Columbus on 12 Oct. 1492 to make the first historic landing on Amer. soil. Columbus's first landing was in the Bahama Is. He believed he had landed in the Indies, and hence called the natives Indians. His return to Spain fired the imagination of the people. The greed for land at once arose. The Portuguese had already sailed along the shores of Africa, colonising is. there. So there arose a dispute between Spain and Portugal over the ownership of this new world. They appealed to Pope Alexander VI, who, in his bull of 2 May 1493, drew an imaginary line of demarcation. Under this all the New World, except a part of Brazil, was given to Spain.

Soon the English took part in the exploration of the new lands. Henry VII granted a permit to John Cabot to go on a voyage of discovery. To Cabot, who, like Columbus, was an Italian, belongs the honour of having first discovered N. America (apart from Ericsson). Cabot landed in 1497, either on Cape Breton Is., Newfoundland, or Labrador. In 1498 he made a second expedition, of which the fate is unknown. Amerigo Vespucci (see VESPUCCI) made 3 voyages of discovery, landing on the coast of Brazil in 1501.

Now began an era of adventure and exploration. Some were attracted by adventure, others by the lure of the gold and jewels they expected to find. The great maritime nations of that time (Spain, England, France, and Portugal) led in this, followed by Holland and Sweden. The Spaniards discovered and explored all Central and S. America and then turned their attention to N. America. Ponce de Léon landed in Florida. Hernando de Soto, sent to Cuba as governor, went to Florida and wandered all over the S. states, discovering the Mississippi R., which he crossed into what is now Arkansas and Missouri. From France came Jacques Cartier in 1534, discovering the Gulf of St Lawrence. On a second expedition he sailed up the St Lawrence as far as the present site of Montreal.

Sir Walter Raleigh founded a first colony in 1585, in the ter. he named Virginia, after the 'virgin queen.' This first colony failed, and the colonists were brought back to England by Sir Francis Drake. They took back with them 2 indigenous plants, the potato and tobacco. In 1607 a second Virginian colony was estab. at Jamestown, by John Smith (q.v.). By 1649 Virginia, which had now a royal charter and considerable self-gov., began to be settled by cavaliers who founded the far-famed 'First Families of Virginia.' The foundation of Maryland marked a new

kind of colony, one practically owned and ruled by a lord-proprietor holding a royal charter. Religious persecution in England led to the foundation of the New England colonies. The first of these occurred in 1620 when the Puritans known as the Pilgrim Fathers landed at Plymouth Rock, in what is now Massachusetts, having sailed on the *Mayflower*. Georgia was founded by James Oglethorpe and was the last of the 13 original colonies which afterwards became the first



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THE STATUE OF CAPTAIN JOHN SMITH
ON JAMESTOWN ISLAND, VIRGINIA

The Jamestown colony, the first permanent English settlement in America, was established by John Smith on 13 May 1607, on a marshy peninsula, now an island, in the James River.

13 states of the U.S.A. Pennsylvania was founded by the Quakers, led by Wm Penn. Ten of these colonies were Eng. New York had been founded by the Dutch as New Amsterdam, and was afterwards to be taken by the English. New Jersey was started as a Dutch colony, but soon became Eng. Delaware was claimed by the Dutch, but was first settled by the Swedes, and finally came into possession of the English.

The wars of Europe had their repercussions in America. France and England engaged in the War of the Sp. Succession (1701-14). The Amer. struggles, extending from 1689 to 1763, are known as the Fr. and Indian wars. The Indians and the French massacred Eng. colonists. In 1710 the colonists, aided by a small force of English, captured Port Royal and took the ter. of Acadia, which was

henceforth called Nova Scotia (q.v.). By the Peace of Utrecht, Acadia, Newfoundland, and the Hudson Bay ter. were ceded to England. The boundary, however, between the Eng. colonies and Canada was not settled, and there was the question of control of the Mississippi valley. The French claimed all N. America, except the Hudson Bay region and the strip of Eng. colonies on the Atlantic coast. In Europe, from 1744 to 1748, England and France were on opposite sides in the War of the Austrian Succession. The Amer. colonies were soon involved. Organised by Governor Shirley of Massachusetts, an expedition under Wm Pepperell of Maine laid siege to and captured the seemingly impregnable Louisburg, but the peace of Aix-la-Chapelle gave this back to France. There was a fresh dispute between France and England about the boundaries of Acadia. They were rival claimants for the Ohio valley.

The Conquest of Canada. In 1754 the war began which was to decide the language and civilisation of N. America. In command of a small body of Virginia militiamen, George Washington (q.v.) came into conflict with the French at Great Meadows and the Fr. commander and 9 of his men were killed. The war thus started in America 2 years before it broke out in Europe. The odds seemed to favour the French, but after initial setbacks, Lord Jeffrey Amherst captured Louisburg (1758); at about this time the French had to evacuate Fort Frontenac, and in Sept. 1759 was fought the decisive battle for the capture of Quebec, which fell into the hands of the English, and the sovereignty of France in N. America was practically ended. By the Peace of Paris, signed 1763, England gave back Cuba and the Philippines to Spain and received Florida instead. France ceded to Spain New Orleans and the vast ter. known as Louisiana (q.v.) (which she regained in 1800). To England France surrendered the Ohio Valley, Canada, everything except 2 is. in the Gulf of St Lawrence.

The American War of Independence. The war helped to unite the colonists in the 13 settlements, and gave them a new conception of their strength and importance. They began to reconsider their position with regard to England. The Eng. Navigation (q.v.) Acts provided a closed market in England to certain colonial goods, but they hampered colonial trade, as all trade went via England, and the prices of goods were raised by duties in transit. Smuggling became universal. The colonies also began manufacturing for their own needs, and England forbade this, the general aim being to export manufs. to the colonies and import raw materials and food. The situation came to a head when George Grenville as Prime Minister decided that the Navigation Acts should be strictly enforced; that a standing army should be garrisoned in the colonies; and that the colonies should be taxed. England proposed to send the standing army to the colonies to protect them

from the dangers of Indian outbreaks, but the colonists believed the army was to be sent to overawe them. Grenville proposed to raise the money for part of the support of this army by a stamp-tax. James Otis, an eloquent Boston lawyer, called upon the colonials to resist. In Virginia Patrick Henry voiced similar sentiments.

Under the leadership of Massachusetts the colonies held a Stamp Act Congress in New York to petition the king and Parliament. Riots occurred and stamps were destroyed. The cry was taken up—'No taxation without representation.' The Eng. gov. failed to appreciate this fundamental cause of discontent, and its gestures of conciliation were therefore of no avail. The Amer. objection to 'internal' taxes imposed from outside was recognised, and the stamp tax was abolished. But the right to tax remained, and as the Americans appeared to be willing to accept 'external' taxation, i.e. customs duties, Townshend, as chancellor of the Exchequer, secured in 1767 an import duty on tea, glass, and other articles. The revenue so obtained was used to pay the officials of the Crown appointed to the colonies. To the Eng. Gov. this seemed reasonable, but to their surprise Amer. protests continued. Mob opposition, which had been silenced by the repeal of the Stamp Act, was again roused, and the import duties were repealed except that on tea, which was retained simply as a token tax. The colonials refused to buy supplies of Eng. tea, and smuggled it from Holland. In 1773 tea-laden vessels reached Amer. ports. In Charleston the cargo rotted in storage. In Boston a band of men disguised as Indians boarded the tea ships and tossed tea chests into the sea, an episode known as 'the Boston tea-party.' George III called upon Parliament to pass drastic Acts, including the removal of the cap. of Massachusetts from Boston to Salem, and the annulment of the colony's charter. All the colonies prepared to stand by Massachusetts, and the first Continental Congress was held at Philadelphia, 5 Sept. 1774. It was resolved to draft an appeal to the king, to the people of England, and the people of Canada. The idea of independence was disavowed, and in fact it was not until later that the elements which did press for independence gained control. Events moved rapidly. Gen. Gage was sent to Massachusetts with a military force, and became both military and civil governor. Whilst attempting to arrest 2 of the popular leaders his troops opened fire on a small body of Americans at Lexington, but in the fight which followed at Concord they lost 273 men and the Americans 93. The War of Independence had started, the product of complex factors, but basically due to Britain's refusal to recognise that, economically and psychologically, the Amer. colonies had attained a status which demanded an alteration in the theory and practice of their relations with England.

The second Continental Congress met
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in Philadelphia and appointed George Washington commander-in-chief of the Amer. forces. It was not yet prepared to throw off allegiance to the Crown. At Boston the British were reinforced by the arrival of Howe, Clinton, and Burgoyne with additional troops, which raised the total forces to 10,000. The Amer. army occupied the mainland and a force was sent to fortify Bunker Hill. Here on 17 June 1775 was fought a battle won by the British only with great loss. On 4 July 1776 the Continental Congress passed its Declaration of Independence, largely written by Thomas Jefferson. Prior to that, in Mar., Gen. Howe evacuated Boston, as Washington had fortified Dorchester Heights and by heavy bombardment obtained the mastery of the city. Despite Brit. successes at Long Is., White Plains, and Fort Lee, and the fall of Newark, New Brunswick, and Trenton, Washington defeated Lord Cornwallis at Princeton (1776). St Leger was defeated by Herkimer, and Gen. Burgoyne surrendered to Gates after the battle of Saratoga.

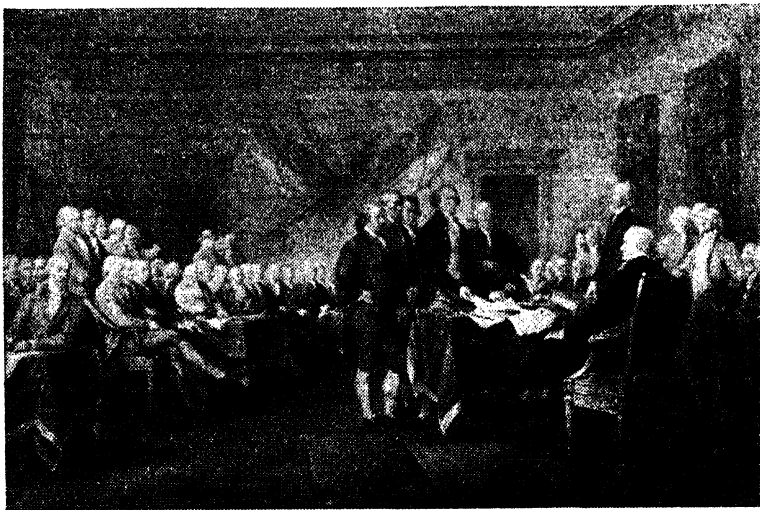
In Feb. 1778 the Amer. emissaries concluded a treaty with France whereby that country was to come to the aid of the Americans and thus strike a blow at its old enemy, England. Also that spring, Lord North reversed his policy and induced Parliament to pass laws enabling him to send peace commissioners to America. All the Americans had asked for and more was promised, but the terms were refused. Spain also intervened in the war in 1779 by using New Orleans as a base for privateers against Brit. shipping. In 1780 the Netherlands also joined in the war against England, while Catherine II of Russia formed a league of armed neutrality, which assisted the Amer. colonies by obstructing the use of England's sea power. Thus the Amer. War of Independence was part of a general war in which most of the great powers participated. Late in 1777, prior to these events, the Americans had been defeated at the Brandywine and at Germantown, and Howe had occupied Philadelphia, the cap. Clinton succeeded Howe as commander of the Brit. forces and was ordered to evacuate Philadelphia and return to New York. Washington hung on his flanks, and the drawn battle of Monmouth was fought 28 June 1778. It was the last general engagement fought on N. soil. Clinton occupied New York, Washington took up his position at White Plains near by, and here the enemies remained watching each other for 3 years, while the real fighting took place in the S. At first everything went well with the English, but in the late summer of 1781 Cornwallis found himself besieged in Yorktown by Washington and Lafayette, the Fr. commander. On 19 Oct. he surrendered.

For sea fighting, the Americans had built men-of-war, and at one time 70,000 men were engaged in naval warfare. The outstanding hero was John Paul Jones (q.v.). Many of the battles he and his fellow commanders fought were in Brit. waters.

The peace treaty was signed at Paris, 3 Sept. 1783, the Amer. commissioners being Benjamin Franklin, John Jay, and John Adams. The peace of Paris with the Americans and the other treaties which Great Britain signed on the same day with France and Spain, divided N. America among Spain, the Brit. Empire, and the U.S.A. Spain received the land W. of the Mississippi and S. of a line which gave her Florida. England kept what is now Canada, though the boundary was not clearly settled at the time. France took a few W. Indian colonies.

should be the present city of Washington. The national debt was founded and paid in interest-bearing bonds. In 1794 came the first real test of the new gov.'s power. Farmers in Pennsylvania resisted the excise tax on whisky. Washington sent to the governors of Pennsylvania, Maryland, New Jersey, and Virginia for troops, and the rebellion collapsed. Two terms of Washington's presidency saw the rise of political parties. Alexander Hamilton founded the Federalist party, Thomas Jefferson, the Republicans.

The young rep. soon became involved



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THE DECLARATION OF INDEPENDENCE: THE PAINTING BY JOHN TRUMBULL

Here before the Congress which adopted the Declaration, Thomas Jefferson offers the document to John Hancock for his signature. On Jefferson's left stands Benjamin Franklin, and on his right John Adams, Roger Sherman, and Robert Livingston.

The Americans now had their independence, but their country was in a state of confusion. Finally, a convention was held at Philadelphia (1787) to draft a constitution and form the permanent gov. for the new country. The constitution was the result of a series of compromises, and there were vigorous contests before the states ratified it, the last being Rhode Island in 1790. The actual voting for the first president and vice-president took place in Jan. 1789. By common consent Washington was chosen as head of the state. John Adams was chosen vice-president. New York City became the first temporary cap., and Congress settled down to the work of gov. It passed a Tariff Act to raise revenue, it enacted a law forming the president's cabinet, and it created the Supreme Court of the country. It was decided that the cap.

in the troubles of Europe. England, engaged in a war with France, claimed the right to search Amer. neutral vessels, and impressed seamen of Amer. ships. Washington had determined to retire to private life at the end of his second term. The first real campaign for the presidency now began. John Adams, who was the Federalist candidate, was chosen by the electoral college in 1797 by 71 to 68 votes, and Jefferson became vice-president. Adams's administration became odious on account of the Alien and Sedition Laws. The former gave the president power to banish from the country, without giving any reason and without a trial, any alien he considered dangerous. Adams also sought to silence the Press. By the election of 1800, Jefferson became president.

Jefferson's assumption of office marked the beginning of real democratic rule in

America. It was a rapidly growing country over which he presided. The 1800 census showed a pop. of over 5,300,000, though one-fifth were slaves. Virginia was still the most populous state, Pennsylvania second, New York third, Massachusetts fourth. Already the people had begun to look westward, and more than half a million had settled in the Mississippi valley. The greatest of Jefferson's achievements was the famous Louisiana Purchase, by which an empire was added to the U.S.A. for \$15m. The treaty, which was signed with France, 30 April 1803, added 1,171,931 sq. m. of ter. to the U.S.A., a greater domain than the 13 original states combined.

Jefferson had been triumphantly re-elected president in 1804. France and England were once more at war. Napoleon issued his Berlin Decrees; England retorted to this by closing all Fr. ports to neutrals. Between them England and France were paralysing Amer. sea-borne commerce, and Jefferson saw no way to make war upon the 2 greatest powers in Europe. On 22 Dec. 1807 he got Congress to pass the Embargo Act, by which, for a time, all foreign commerce was forbidden. Jefferson believed the warring powers would abandon their decrees because they needed Amer. commerce. He was mistaken, however, and Amer. farm products accumulated in warehouses, and ships lay rotting in harbours. Subsequent legislation repealed the Embargo Act, but failed to achieve Jefferson's purposes.

In 1808 Jefferson's secretary of state James Madison, one of the chief framers of the constitution, was elected fourth president of the U.S.A. There were skirmishes with the Shawnee Indians under Tecumseh. Then came the culmination of the troubles with England.

The War of 1812-14. It was evident that the Americans would be adamant unless the orders in council were repealed. Meanwhile, Congress was pressing Madison to declare war. The Brit. ministry was slowly yielding on all the points pressed by the Americans, and the orders in council were repealed on 23 June. But before the news of this repeal came to America Madison had signed a declaration of war. In the autumn he was re-elected president after a severe contest, the Federalists being opposed to the war.

The war opened badly for the Americans. The Brit. gen. Isaac Brock invaded the U.S.A. from Canada. On 16 Aug. 1812 Governor Hull surrendered Detroit and with it Michigan ter. without striking a blow. On the same day Fort Dearborn, on the site of the future city of Chicago, was taken by Indians. The Americans were more successful at sea, and though the superior might of the Brit. Navy soon became evident, Amer. privateers did considerable damage to vessels of the Brit. merchant marine. In the meantime, on land the Amer. troops met with disaster in a fight at the R. Raisin. Perry's victory on Lake Erie in Sept. 1813 made it possible for Amer.

troops under Gen. W. H. Harrison to invade Canada, and a battle was fought on the R. Thames, 5 Oct. 1813, which the Americans won. Tecumseh, the Indian chief, being slain. As a result of this victory, Michigan was once more held by the Americans, and the war in that quarter was ended. Prevost abandoned the campaign to invade New York State. But by now the Brit. Gov. was able to display its true military power. A flotilla of ships reached Chesapeake Bay in Aug. 1814 and an army was landed which met the Americans at Bladensburg, defeating them. Washington, the cap. of the nation, was captured. The Capitol, the White House, residence of the Amer. presidents, and the navy yard were burnt down. It was decided to march northward and take the important city of Baltimore. However, the troops were stopped by Amer. resistance and the fleet could not pass Fort McHenry. The British abandoned the campaign and sailed away with the troops. Meanwhile in Alabama, Andrew Jackson defeated the Indians at Talladega. He was then made commanding gen. of all the S. ter. In the autumn of 1814 it became known that the British had decided upon an attack on New Orleans with the object of capturing the entire Louisiana ter., Jackson hastened there and put the city into a state of defence. The enemies met in front of New Orleans on 23 and 24 Dec. 1814, and fierce battles were fought without victory for either side. Jackson's defeat of the British at New Orleans took place 8 Jan. 1815, although the treaty of peace had already been signed, on 24 Dec. 1814. It was the last time Amer. and Brit. soldiers met as enemies. The treaty merely ended hostilities; there was no cession of ter. by either side; there was no written agreement about impressment of seamen; and all the old disputes about boundaries, fishery rights, and navigation of the Mississippi were left open for settlement at a later time.

The U.S.A. before the Civil War. In 1816 James Monroe (1758-1831) was elected president, and again in 1820. Early in his first administration trouble broke out with the Seminole Indians, but was speedily ended by Amer. troops under Andrew Jackson. This brought the country into conflict with Spain, which still owned Florida (Britain having returned it in 1783). In 1822, however, Spain ceded that country to the U.S.A. for \$5m., and by the same treaty the U.S.A. gave up its claim to Texas, which thus became Sp. ter. The U.S.A. was rapidly growing in pop., and the W. was being settled. A number of new states had been admitted to the Union, including Louisiana and Indiana. Now came the question of admitting Missouri, and it was then that the slavery question became acute. The N. wanted to stop the admission of states in which slavery was allowed; the S. wanted exactly the opposite. Missouri was finally admitted in 1820 by the Missouri Compromise (q.v.), which in addition decreed that slavery should be prohibited in all the remainder

of the Louisiana ter. N. of 36° 30' N. lat. In Dec. 1823 Monroe signed the document which had made his name famous, the message embodying the Monroe Doctrine (q.v.).

The election of 1824 gave Andrew Jackson the most votes in the electoral college, but not a majority over all the other candidates. His nearest opponent was John Quincy Adams (1767-1848), who was the son of the second president. The election of a president was therefore thrown into the House of Representatives and Adams was chosen. He was never popular, both Houses of Congress were

the Democratic party. In 1837 van Buren urged the creation of an independent treasury system to take the place of the U.S. Bank, and this finally became law in 1840. In the same year van Buren was renominated for the presidency by the Democrats. The Whigs nominated Wm Henry Harrison (1773-1841), and John Tyler was nominated for vice-president. Harrison was easily elected, but he d. exactly 1 month after taking office, and Tyler (1790-1862) succeeded him. A feature of his administration was the Webster-Ashburton Treaty between the U.S.A. and England, whereby the



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THE COVERED WAGON: EMIGRANTS CROSSING THE PLAINS

against him, and no administrative measure of any importance was passed. In 1828 he ran for re-election, but was heavily defeated by Andrew Jackson (1767-1845).

In the presidential election of 1833 Henry Clay unsuccessfully opposed Jackson. The issue between them was the U.S. Bank, under whose charter and powers the financial control of the nation rested. Jackson was its opponent, believing it was corrupting the politics of the nation. On his own authority he removed from the bank the U.S. deposits, and thus ruined it. He practically dictated the presidential nomination of Martin van Buren (1782-1862) by the Democratic party in 1836. Van Buren had been his secretary of state and later vice-president. Shortly after van Buren's induction came the great panic of 1837, for which his political opponents blamed

boundaries between Maine and New Brunswick, Canada, were settled. The Texas question soon came to the fore. In 1827 Mexico had freed her slaves, but her N. prov. of Texas refused to do so, and in 1836 declared her independence. This was recognised by the U.S.A. and by some of the European powers; and having defeated the Mexicans in the battle of San Jacinto, Texas applied for admission as a state of the U.S.A. In 1844 Tyler sent in a treaty annexing Texas, but the Senate rejected it. The question thus became a main issue in the 1844 presidential campaign. The Democrats pronounced for the annexation of Texas, and finally the Democrat James K. Polk (1795-1849) was chosen. The Texas matter had been settled before Polk took office, Congress passing a joint resolution to annex that vast ter. and admit it to the Union. Polk announced an ambitious programme

and carried it out. A Bill re-creating an independent national treasury became law in 1846, and in the same year he signed a Tariff Bill which lowered many of the duties in the old Whig Tariff Bill. He now turned his attention to the Oregon problem involving the great ter. in the NW. from the Rocky Mts to the Pacific, lying between 42° and 54° 40' N. lat., which had been occupied jointly by England and the U.S.A. In 1846 a compromise was arranged; instead of 54° 40', the boundary line was fixed at 49° N. lat., the U.S.A. thus securing 300,000 sq. m. of ter. and England securing for the future Canada a sea coast on the Pacific and the whole of Vancouver Island. The last item in Polk's programme was the acquisition of California. California belonged to Mexico, and that country refused to sell it. Occasion for war and conquest was found in the dispute between the U.S.A. and Mexico over their boundaries. Polk had sent Gen. Zachary Taylor with an army of occupation into the disputed Texas ter. On 8 and 9 May 1846 a Mexican army was defeated at Palao Alto and Resaca de la Palma. Polk made a declaration of war on Mexico, and a series of battles resulted in a total Mexican defeat. The treaty of peace, signed 2 Feb 1848, ceded to the U.S.A. the ter. which is now the states of California, Nevada, and Utah and parts of New Mexico, Arizona, and Colorado.

Only 9 days before the treaty was signed gold was discovered in California, and the famous gold rush began which in 2 years increased the pop. of that state to 100,000. Zachary Taylor (1784-1850), nominated by the Whigs, was elected president in 1848. The slavery question at once became prominent. California was claiming entrance into the Union, and in 1849 adopted a state constitution excluding slavery. Taylor was a southerner and slave-owner, but he recommended that California be admitted as a free state. Enraged southern statesmen freely spoke of dissolution of the Union. The year 1850 was a fateful one. Clay brought into the Senate his compromise measures, which provided, among other things, for the admission of California as a free state, prohibition of slavery in the Dist. of Columbia, where the cap. was situated, and a new fugitive slave law. While the debate was still pending, President Taylor died. He was succeeded by the vice-president Millard Fillmore (1800-74). California was admitted as a free state, but the fugitive slave law was also adopted. In many N. states there was covert rebellion against the law.

In the presidential election of 1852 the main issue was the fugitive slave law, and the Democrats nominated Franklin Pierce (1804-69). He carried all the states except 4, thus obtaining a sweeping victory. It was the death-blow to the Whig party. Pierce began well, but he soon lost popularity, being an opponent of the abolitionists. At this moment Stephen A. Douglas attacked the Missouri Compromise, whereby ter. N. of 36° 30' was to be free soil. He brought in a Bill

which maintained that it was the purpose of Congress that all future ter. and states be admitted on the same principle, viz. that the people themselves should decide for or against slavery. Secondly, he maintained that the Missouri Compromise Bill was unconstitutional. Douglas then introduced another Bill, known as the Kansas-Nebraska Bill, virtually repealing the Missouri Compromise, which had stood as a treaty between N. and S. for over 30 years. It passed both houses. Throughout the N. mass-meetings and legislatures denounced the Bill, and condemned Douglas. His action alienated N. states, which had hitherto been Democratic, and it paved the way for the formation of the new Republican party, which is said to have had its inception in Ripon, Wisconsin, on 30 Mar. 1854, where the citizens called for the formation of a free-soil party to be known as Republican.

In the presidential campaign of 1856 the Democratic convention nominated James Buchanan (1791-1868), and the platform endorsed the Kansas-Nebraska Law. The Republicans nominated John C. Fremont. Buchanan was elected, carrying 10 S. and 5 N. states, while Fremont carried all the rest of the N. After the Kansas-Nebraska Bill was passed, people from Missouri had poured into Kansas for the purpose of making it a slave state; and the N. sent bodies of immigrants into the ter., determined to make it free soil. The free-soilers framed a constitution making Kansas a free state, and it was ratified by the people, the pro-slavery party ignoring the election of a territorial legislature. There was a state approaching civil war in Kansas. John Brown (q.v.), the abolitionist, led a night raid of free-soilers on the vil. of Pottawatomie and killed some pro-slavery adherents. After that rival armed bands roamed the state and made war upon each other. Buchanan appointed R. J. Walker of Mississippi governor of Kansas. Walker was a Democrat and former slave-owner, but he would have no part in the pro-slavery machinations. A pro-slavery convention met at Leecompton and produced a constitution which in effect meant that Kansas would be a slave state. Walker had promised the people a vote on it. Buchanan had supported him, but he now broke his word and prepared to force the admission of Kansas with the Leecompton constitution. He sent the constitution to Congress and urged that Kansas be made a state under it. It was at this juncture that Douglas, who now saw that the Kansas-Nebraska Bill had been a mistake, defied the president and his party and opposed the Kansas constitution in a speech which made him once more the favourite of the N. Democrats and defeated the Bill not in the Senate, where he spoke, but in the House. At the opening of the Civil war, Kansas was finally admitted as a free state. (See also DRED SCOTT CASE, THE.)

On 17 Oct. 1859 a crowd of abolitionists and Negroes under the leadership of John Brown (q.v.) seized the U.S. arsenal at Harpers Ferry, Virginia. The gov. sent

forces under Colonel Robert E. Lee and J. E. B. Stuart. Brown was captured, tried for treason and murder, and hanged.

Then came the momentous presidential campaign of 1860. The Democrats were divided among themselves. The Republicans nominated Abraham Lincoln on a platform which pronounced slavery an evil and denied the right of Congress to give legality to slavery in any ter. Lincoln obtained 180 votes in the electoral college, 152 being enough to elect. Lincoln had swept the N., but the threats of secession made by S. orators for 40 years were about to be realised. Some months before Lincoln was inaugurated as president, the S. Carolinians held a convention arising out of which, on 20 Dec. 1860, they formally passed secessionist resolutions. They repealed the Act of 1788 by which their state had adopted the constitution and proclaimed the union between S. Carolina and the U.S.A. at an end. Mississippi, Florida, Alabama, Georgia, Louisiana, and Texas soon followed their example at similar conventions. The 7 states held a joint convention at Montgomery, Alabama, 4 Feb. 1861, adopted a temporary constitution and chose as provisional president and vice-president Jefferson Davis and A. H. Stephens of Georgia respectively. The whole move seemed fantastic to the people of the N., in view of the Republican pledge that they would not interfere with slavery where it already existed, and the further fact that both Houses of Congress were still Democratic. While these events were in progress, President Buchanan vacillated. As state after state seceded, their senators and congressmen withdrew from Congress. In many of the S. states, forts, arsenals, and munition supplies belonging to the national gov. were taken over by the Southerners. Before Buchanan left office this was the case everywhere with a few striking exceptions, the chief of which were the forts guarding the harbour of Charleston, S. Carolina, where secession began. Here Maj. Robert Anderson left Fort Moultrie and took its guns to the stronger Fort Sumter, where he prepared to hold out with the regular Amer. soldiers. Buchanan sent the *Star of the West* to carry further ammunition supplies, but it was fired upon by the shore batteries in charge of S. Carolinians and driven away. These constituted the first shots in the war.

The Civil War. In Mar. 1861 Lincoln was inaugurated as president. In his speech he affirmed that he did not propose to interfere with slavery where it already existed. He said he would uphold the fugitive slave law. He said he would support a proposal made in the House of Representatives to add an immutable amendment to the constitution which would make slavery perpetual in the states where it already existed. But he also said that the Union was intact and must remain so. He asserted that no state could withdraw from the Union, and that it would be his duty to preserve, protect, and defend the Union.

A little more than a month later, Lincoln, against the advice of a majority of his cabinet, decided that Fort Sumter must be relieved, and in accordance with a promise made to the governor of S. Carolina, notified him, on 8 April 1861, of this intention. The Confederate cabinet was also divided, but militant counsels finally prevailed, and Gen. P. G. T. Beauregard, who had resigned his post in the Amer. army and was now in charge of the Charleston forces, was ordered to take the fort. The bombardment began on 12 April and 34 hrs later the fort was surrendered. Two days later Lincoln issued a call for 75,000 troops. N. Democratic leaders rallied to the cause. In the S., Virginia, which had at first been against secession, now joined the Confederacy and soon all the 11 S. states were united. There were 4 border states which were also slave states—Delaware, Maryland, Kentucky, and Missouri. Special efforts were made by the S. to win Missouri and Kentucky. The governors of those commonwealths favoured secession, but their legislatures defeated them.

In the conflict which was now beginning the N. had certain great advantages which were bound ultimately to weigh decisively in the balance. It had 4 times as many white people as the S. It had greater wealth. It was immeasurably more advanced in manufs., the S. being mainly agric. and dependent for most other things on purchases from the N. and from Europe. The N. also had better railway lines. It was completely self-contained. It could meet all its own needs and those of its armies. If there was to be a lengthy war, the N. numbers would tell. The N., too, had the stronger navy and soon had command of the sea, enabling the gov. to blockade the ports of the S. Thus the decisive factors lay mainly with the Union.

If Lincoln called for 75,000 troops, Davis asked for 100,000 and at the same time moved the cap. to Richmond. The first real clash of arms came on 21 July 1861 between the N. army under Gen. Irvin McDowell and the Southerners under Beauregard and Johnston, at the battle of Bull Run. The Union forces were completely routed, retreating as far as Washington. While the fighting was going on in Virginia and Missouri, relations with England assumed great importance. There was dismay in the N. when on 14 May 1861 a proclamation of neutrality was issued by England which accorded to the Confederacy belligerent rights such as are granted to a sovereign nation. Most of the European nations soon followed. Nor was the situation improved when the so-called Trent affair occurred. But the N. was beginning to gather strength. Nearly half a million men had come to the colours when only about half that number had responded so far in the S.

By 1862 the first advance towards the S. was begun. After sev. battles and a brief investment U. S. Grant captured Fort Donelson on the Cumberland R.; the Confederate Gen. Buckner was forced to accept Grant's stipulation of uncon-

ditional surrender, and gave up an army of 14,000 men. The opposing forces next met in battle at Shiloh on 6 April 1862. The first day's fighting favoured the Confederates, but Albert S. Johnston, one of the most brilliant of the Confederate commanders, was killed. In the second day's fighting the Union forces won and the Confederates retreated to Corinth. One of the results of this battle was that Grant discovered in W. T. Sherman one of his ablest lieutenants, and from that time on assigned to him some of his most difficult tasks. Another great blow was struck at the Confederates when a fleet under David G. Farragut (q.v.) ran past the forts protecting New Orleans and captured it.

In Mar. 1862 Gen McClellan came up with the Confederates at Yorktown. His army had been weakened by the sudden withdrawal of 25,000 men to defend Washington, and he settled down for a siege, only to find that the enemy had retreated. He met them in battle at Williamsburg, where once more the enemy retreated towards Richmond. McClellan was again ready to move, when the officials at Washington conceived the idea of crushing Jackson, who was in the Shenandoah valley. President Davis sent reinforcements to Jackson. That great soldier defeated Banks at Winchester, evaded the other 2 Union armies which were seeking him, and triumphantly led his men back to join the forces in line near Richmond. In the meantime, on 31 May and 1 June, McClellan's army fought a great battle at Fair Oaks. At first it seemed as if the Union force had lost the day, but the sudden and timely arrival of a new corps changed things and the Confederates were put to flight. McClellan was now only 6 m. from Richmond, but the swamps of the Chickahominy lay between and saved the cap. for the time being. A new Confederate commander came upon the scene, Robert E. Lee. Davis appointed Lee as commander-in-chief of the S. armies. Lee was quick to take advantage of the pause in McClellan's movement. He rushed up reinforcements from all over the S. until he had an effective fighting force of 90,000 men against his enemy's 100,000. Then ensued the Seven Days' battles. Two severe engagements were fought in the last days of June at Mechanicsville and Gaines Mill, and on 1 July was fought the battle of Malvern Hill. The Union forces settled down at last on the bank of the James R., while Lee withdrew to the defences of Richmond. Once more McClellan was ready to attempt the capture of Richmond. But all his plans were rendered nugatory, because the gov. ordered him to return with his army to cover Washington. There was dissatisfaction in the N., but there was really not much cause for complaint: Kentucky and Missouri had not seceded; Arkansas and Tennessee had been taken by Union forces; New Orleans was already in process of encircling the Confederacy. The administration made Gen. Halleck com-

mander-in-chief and gave Gen. Pope the best part of McClellan's army. On 29 Aug. 1862 was fought the second battle of Bull Run and the Union armies were beaten. Another defeat at Chantilly completely destroyed Pope's reputation as a gen. Lincoln called on McClellan to resume command of the army at the Potomac once more. Lee had moved into Maryland, thinking to win that state to the Confederacy, to capture Baltimore, and then advance into Pennsylvania, thus carrying the war into Union ter. The stage was now set for the great struggle at Antietam, 17 Sept. 1862. The battle was drawn, 23,000 dead being left on the field. Lee retreated across the Potomac and McClellan delayed in following his enemy. He was now relieved for good. Lincoln then took one of his most important steps. Hitherto he had merely struggled to preserve the Union intact. The slavery question had been held in abeyance for fear of alienating the Democrats in the N. and the people in the border states. But now, on 22 Sept. 1862, he issued his famous proclamation of emancipation, declaring that the slaves in all states in rebellion against the gov. should be free on and after 1 Jan. 1863. The reaction in Europe was immediate, most nations being in sympathy with the abolition of slavery. But there was a reaction in the N. itself. The Democrats made big gains in the Nov. elections, and it was only New England and the border states which kept the House of Representatives Republican.

In the autumn of 1862 Rosecrans won victories at Corinth and Murfreesboro, and most of Tennessee was in his possession. In the E., on 13 Dec. 1862, Lee severely defeated Burnside in the battle of Fredericksburg. In the first days of May 1863 the Confederates won a great battle at Chancellorsville, but it cost them the life of Stonewall Jackson. In the W. Grant had conceived the idea of taking Vicksburg, Mississippi. After various failures he at last invested Vicksburg with his army and a fleet of ironclads. The siege lasted 6 weeks and on 4 July 1863 the town was surrendered. While the siege was still in progress the greatest battle of the war was fought at Gettysburg, Pennsylvania, Lee retreating to Virginia. This was the turning point of the war.

In Sept. 1863 Bragg beat the Union forces under Rosecrans at Chickamauga in Tennessee. Then followed the battle of Lookout Mt. The Confederates retreated to Georgia. These last battles had been fought with Grant as commander-in-chief. In Feb. 1864 Lincoln made him lieutenant-gen. in charge of all the armies. Grant now planned to end the war. He himself would face Lee in Virginia, seek to destroy his army, and take Richmond. At the same time he would send Sherman to face Gen. J. E. Johnston in Georgia. In May 1864 began the 2 indecisive battles of the Wilderness of Virginia and of Spottsylvania. On 3 June 1864 the enemies met at Cold Harbor, and here in less than

an hr over 12,000 Union soldiers were killed or wounded. Grant had lost 60,000 men in this campaign; and the Confederates 40,000; but he knew that the S. could not replace its losses in manpower, whereas the N. could. In the early autumn months Sherman won victories at Winchester and Cedar Creek and then laid waste the entire Shenandoah Valley. While Grant was fighting in the Wilderness Sherman began his march from Chattanooga. On 2 Sept. 1864 he entered Atlanta. In the meantime, in Aug. Adm. Farragut had won his famous victory of Mobile Bay, which had been the harbour for the Confederate blockade runners, a victory which destroyed the Confederate fleet. In Nov., after strong opposition in his own party, Lincoln was re-nominated for president by the Republicans, and Andrew Johnson, a war Democrat from Tennessee, was nominated for vice-president. Gen. McClellan was nominated by the Democrats. Lincoln was easily re-elected. Less than 2 weeks after the election Sherman set out on his famous march to the sea from Atlanta. The army of 62,000 men accomplished the 300-m. journey, leaving destruction in its wake. On 21 Dec. Sherman entered Savannah unopposed. Gen. Thomas won the battle of Nashville in Dec. 1864 and thus drove the last of the Confederates out of Tennessee. In Jan. 1865 Wilmington, N. Carolina, was taken by joint naval and military action, and the last remaining port of the Confederacy was closed. Sherman began his march back from the sea. Columbia was burned down, and Charleston was deserted by the Confederates. An abortive attempt at peace failed, but the end was in sight. Grant, with his superior numbers, was encircling Petersburg and Richmond. On 2 April the Union forces attacked Petersburg and captured it. At length, on 3 April 1865, the Union armies entered Richmond. Lee was completely surrounded. At Appomattox Court House on 9 April he surrendered. Johnston surrendered his army to Sherman on 26 April, and by the end of May all the rest of the organised forces in the far S. had also laid down their arms.

In this costly civil war half a million lives had been lost, while tens of thousands of soldiers returned with health permanently impaired. The public debt of the Union had risen to nearly \$3 billion. What it cost the Confederacy has never been definitely estimated. Despite all this, the N. was stronger than ever; the S. was ruined. It is perhaps true to say that, because of the vindictiveness in the post-war years, real union between the sections was not really attained until the Sp.-Amer. War when a Republican and N. president, Wm McKinley, had the courage and inspiration to call to high command some of the last notable surviving figures of the old Confederate army.

The general rejoicing in the N. came to a sudden end when on 14 April 1865 President Lincoln was assassinated. He had been ready to accord the rebel states generous treatment; but his views did

not meet with the approval of Radicals in Congress. Lincoln had been succeeded by Andrew Johnson, who maintained Lincoln's attitude towards the S. On 29 May 1865 he issued a pardon proclamation to the entire S. The only exceptions were the leaders, and most of these were promised pardon if they accepted certain conditions. Under him, too, the 13th Amendment to the Constitution, forbidding slavery in the U.S.A., was adopted. But Johnson had not reckoned with Congress, which met on 4 Dec. 1865 and at once passed a Bill for the appointment of a committee whose function was to inquire into the question of the S. States. In Mar. they passed, over Johnson's veto, a Bill giving the Negroes full rights as citizens, and this was afterwards embodied in the 14th Amendment to the Constitution. No S. State could come back into the Union unless it ratified this amendment. Tennessee alone did so. In the autumn of 1866 came the election of a new House of Representatives, and the opposition to Johnson prevailed decisively. Now the road was clear for the most malignant enemies of the S. Their plan was to keep troops in the S., enfranchise the ex-slaves, and keep the conquered section as a group of permanent Republican states. One of their Acts provided that citizens, white and coloured, taking the oath of allegiance should vote for delegates to a constitutional convention in each S. state. This 14th Amendment not only admitted the Negroes as voters, but practically disfranchised the S. white leaders. Three states, Virginia, Mississippi, and Texas, failed to come in. The other 7 did so only by reason of Negro and white 'carpet-bagger' votes. To make sure that this regime would endure the 15th Amendment was adopted, denying to any state the right to disfranchise a man on account of race, colour, or previous servitude. With the bulk of the whites disfranchised, the voting was by the Negroes and by those whites who had come mainly from the N. seeking what they could loot. Those former Confederates who joined in the plunder were known as 'scalawags.' The legislatures were largely made up of ignorant ex-slaves, and their white leaders easily procured them to pass all kinds of Appropriation Bills. The unfortunate S. states were plunged into huge debts. In the end the S. whites formed the notorious Ku-Klux Klan which struck terror both into the Negroes and the 'carpet-baggers.' Matters came to a climax with President Johnson, when he dismissed Stanton, his secretary for war. The House of Representatives adopted a resolution for the impeachment of the president. Johnson was saved by a single vote.

The Growth of U.S. Big Business—The Opening of the West. In the presidential campaign of 1868 the Republicans chose Gen. Grant, who defeated his Democratic opponent, Horatio Seymour of New York. Grant's first administration was marked by a series of measures aimed at gagging the S., and by the *Alabama* (q.v.) affair.

In 1872 Grant was renominated by the Republicans. His second term was filled with more scandals than the first. Corruption in administration was the political reflection of the licence which the industrialists were allowing themselves. The era of 'reconstruction' was the beginning of 'big business,' which in the years which followed produced J. D. Rockefeller, Andrew Carnegie, J. Pierpont Morgan, and others who controlled vast monopolistic enterprises. The industrialisation of the country was made possible by the rapid building of railways after the Civil war had ended. The Union Pacific Railroad was completed in 1869, and the network soon spread over the whole continent. The West was opened up, and the pioneers were followed by the farmers. The agrarian movement paralleled the industrial, and became a political force when the farmers formed a co-operative organisation, known as the Grange, to protect themselves from the effects of low prices and excessive freight charges. The disappearance of the 'Wild West' as an ever-expanding frontier, the cultivation of the land, the growth of the pop. through immigration, the development of manufactures, all contributed in the second half of the cent. to the phenomenal growth of cities. There was extreme wealth and extreme poverty. Labour in the factories was poorly paid, and slow to organise (*see under TRADE UNIONS*). The labour movement, the control of capitalistic enterprise, and the economics of agriculture formed the 3 major problems confronting successive presidents. In the succeeding years presidential elections turned principally upon tariffs, pensions, and the free silver issue. Grant's administration was followed by a run of 3 Republicans: Rutherford B. Hayes (1876); James A. Garfield (1881, assassinated 1881); and Chester A. Arthur (1881). In 1884 Grover Cleveland was elected, the first Democrat president since the Civil war. In 1888 Benjamin Harrison, Republican, defeated Cleveland when the latter ran for re-election, but in 1892 Cleveland was again elected president. Wm McKinley, a Republican, became president in 1896.

For years the people of Cuba had been in revolt against Sp. rule. President Cleveland had warned Spain that the U.S.A. could not look on calmly. In Jan. 1898 he sent the battleship *Maine* to Havana to guard Amer. interests. On the night of 15 Feb. the ship was blown up and 266 of her crew lost their lives. On 21 Mar. a naval committee of inquiry reported that the tragedy was caused by the explosion of a submarine mine. The call for war was now more insistent. On 25 April war was formally declared (*see SPANISH-AMERICAN WAR*).

In the presidential election of 1900 McKinley was easily re-elected, but on 6 Sept. 1901, he was shot by an anarchist and *d.* on 14 Sept. Theodore Roosevelt (1858-1919), who had been elected vice-president, succeeded to the presidency. It was realised that a new era had been inaugurated. Roosevelt had made ene-

mies of the political bosses, whom McKinley knew how to placate. In the summer of 1902 the anthracite coal region was paralysed through a strike which lasted until Roosevelt intervened and induced both sides to agree to arbitration. Roosevelt had actively taken up the matter of building the Panama Canal when negotiations with Colombia failed. Roosevelt recognised the Panama Rep. and concluded a bargain which made the construction of the canal possible (*see PANAMA CANAL*). In 1904 the Republicans nominated Roosevelt, who thus ran for the presidency in his own right, and he was elected. In the next presidential election the Democrats nominated Bryan for a third time, but W. H. Taft (1857-1930) was elected. Congress passed another high tariff Bill, the Payne-Aldrich Act, which Taft signed, although at heart he had been in favour of lower duties.

When the Republicans held their nominating convention in 1912 Taft was nominated after contesting delegations favouring Roosevelt were ruled out. Thereupon Roosevelt formed his Bull Moose (q.v.) party and ran as its candidate. Woodrow Wilson, who had been governor of New Jersey, was nominated by the Democrats. Largely due to the split in the Republican ranks, he won by an overwhelming majority. Under his impulsion in his first term Congress passed the Underwood Act, which greatly lowered the tariffs; a finance Bill, which took the control of the nation's finances out of the hands of Wall Street and placed it under the Federal Reserve Banks; and a Bill placing Amer. on an equality with foreign vessels in the matter of Panama Canal tolls. In 1916 Wilson was renominated and defeated Charles E. Hughes, the Republican nominee. When the First World War broke out Wilson called upon the people to be neutral, but on 6 April 1917 the U.S. entered the war against Germany. (*See WORLD WAR, FIRST.*)

The U.S.A. between the Two World Wars. When the Peace Conference opened on 18 Jan. 1919 Wilson broke all precedents by attending as head of the Amer. delegation. The draft Treaty did not meet with his approval, but he yielded because the Covenant of the League of Nations (q.v.) was interwoven with it, and he believed that these articles could mitigate the rest. He returned to advocate its adoption by the U.S. Senate, but met increasing opposition. The treaty was eventually rejected by the Senate.

In 1920 a group of Republican Senators and bosses secured the nomination of Senator Warren G. Harding for president. The Democrat nominated James M. Cox, governor of Ohio, but Harding was elected by a large majority. The most creditable achievement of Harding's administration was the calling of the arms conference at Washington in Nov. 1921. Congress passed a Bill limiting immigration into the country and starting the quota system (*see IMMIGRATION*). In Sept. 1922 the Fordney-McCumber Tariff

Bill was passed, its new feature being that the President had power to lower or raise duties on the advice of the Tariff Commission. The regime was darkened by some grave scandals, which brought the administration into disrepute.

After Harding's death Vice-President Calvin Coolidge was sworn in as President. He was nominated for the presidency in his own right, in 1924, and the Democrats nominated J. W. Davis, who had been ambas. to Britain. Coolidge was elected. His policy was to interfere with business as little as possible, economise the nation's money, and reduce taxes and national indebtedness. These things he accomplished. Coolidge secured substantial cuts in the income-tax rates. During Harding's brief term the U.S.A. had made arrangements for the refunding of Great Britain's war loans from the U.S.A. Under Coolidge similar contracts were made with France and Italy. In Jan. 1926, at the persuasion of Coolidge, the Senate voted to have the U.S.A. adhere to the World Court (see under INTERNATIONAL COURT OF JUSTICE), but made the action abortive, because it added reservations which the other signatory powers refused to accept. In 1927 Coolidge sent D. W. Morrow to Mexico, and he succeeded in effecting a settlement of all outstanding questions between the 2 countries. In the same year Aristide Briand, Fr. Foreign Minister, proposed to secretary of state T. B. Kellogg that the U.S.A. and France agree upon a treaty renouncing war between them and agreeing to settle all disputes by pacific method (see KELLOGG PACF). In 1928 Coolidge was succeeded by Herbert C. Hoover. As the result of conversations between MacDonald, the Brit. Prime Minister, and Hoover a Naval Disarmament Conference was arranged which eventuated in the treaty of 22 April 1930.

But everything else that happened in Hoover's term faded into insignificance in comparison with the acute economic crisis, which started with the great New York Stock Exchange slump in the autumn of 1929. Hoover at first attempted to meet the crisis by a policy of 'business as usual' and to prevent a fall in wages. Orthodox methods were, however, insufficient. In 1930 the congressional elections went heavily in favour of the Democrats, as did the governors' elections. The financial plight of the nation occupied public attention during the next 2 years almost to the exclusion of all other matters. Unemployment increased to over 5,000,000. Export trade declined largely as a result of worsening conditions in Europe, and it was in the hope of reviving trade with Europe that President Hoover proposed in June 1931 a moratorium for 1 year on the repayment of both principal and interest on all war debts. This was at first successful, but large withdrawals of gold by European banks which had deposits in the U.S.A. caused a serious drain on the Amer. gold reserve. Congress approved the moratorium, but recorded disapproval of any

proposal to reduce or cancel war debts. Early in 1932 Congress accepted Hoover's proposal to set up a Reconstruction Finance Corporation as a means of helping industry through the slump, but this measure, though it served a useful purpose, did not, however, prevent the decline in popularity of President Hoover's Administration. The result was a landslide in the Democratic favour at the Presidential elections in the autumn of 1932. Franklin D. Roosevelt, the Democratic candidate, gained a popular vote of 22,821,857, which carried 42 states possessing 472 votes in the electoral college. The Democrats also gained a majority in the Senate and increased their previous majority in the House of Representatives.

Roosevelt assumed office on 4 Mar. 1933. The first year of his administration was almost wholly taken up with measures to combat the depression and to bring into effect the 'New Deal' (q.v.) which he had promised the nation. The Economy Act of 1933 was one of the first measures, and was designed to separate emergency spending to meet the depression from the normal budget under which expenditure was reduced. Prices were given an upward trend by 'controlled inflation', and the export of gold abroad was forbidden except under licence, thus taking America off the gold standard. Spending power was increased when employers pledged themselves under the National Industrial Recovery Act (June 1933) to agree to codes of fair competition, price and wage fixing, and other gov. measures. Agriculture was similarly helped by the Agric. Adjustment Act (May 1933), by which commodity prices were raised and overproduction, which was a cause of depression, reduced. This year (1933) is also to be remembered as bringing the Prohibition experiment to an end. The Congress elected in 1934 showed further Democratic gains. Its first consideration was the labour trouble which had arisen as a result of the National Recovery Administration. The latter was brought to an end the following year by a decision of the U.S. Supreme Court to the effect that it was unconstitutional. Shortly afterwards (1936) the Supreme Court ruled that the Agric. Adjustment Act was also unconstitutional. There remained the Farm Credit Administration, also set up in 1933 as part of the New Deal plan for agriculture. This continued the work of the Federal Farm Board, estab. by President Hoover. With the end of the Agric. Adjustment Act, however, production could no longer be controlled, and in 1936 Roosevelt dealt with the problem in another way by the Soil Conservation and Domestic Allotment Act. Grants to farmers were made conditional on their making the best use of their land and preventing soil erosion.

As a result of the set-backs which the New Deal had received at the hands of the Supreme Court, Roosevelt embarked on a 'Second New Deal,' strengthened by his re-election to a second term in 1936. Roosevelt at once set about the

reform of the Supreme Court, but the bill was rejected by Congress. The senior justice resigned, however, and was replaced by one more sympathetic to the New Deal. Roosevelt's second term began with a business "recession," of which excessive gov. expenditure was said to be the cause. A Monopoly Investigation was authorised by Congress, and the anti-trust laws were revived. A new Agric. Adjustment Act was passed in 1938. Opposition to the New Deal had grown, and the Republicans increased their representation in Congress after the mid-term elections (1938). The policy of the New Deal was conducted against a background of foreign affairs which became increasingly disturbed. The World Economic Conference held in London in 1933 had broken down largely through the Amer. preference for economic isolation. In spite of this, a Trade Agreements Act was passed in 1934, allowing the president to negotiate treaties for the mutual reduction of tariffs up to a maximum of 50 per cent. With this mandate, Cordell Hull (q.v.), the secretary of state for foreign affairs, successfully concluded a number of treaties, particularly with Great Britain, Canada, and the countries of S. America. The Latin-Amer. treaties were a facet of the good-neighbour policy to which the president gave expression at an Inter-Amer. Conference for Peace held in Buenos Aires in 1936.

The Amer. attitude to the possibility of war in Europe was shown by the passing of 3 Neutrality Acts in 1935, 1936, and 1937. (See NEUTRALITY, *American Neutrality Legislation*.)

In April 1939 Roosevelt tried to remove the threat of war in Europe by a fruitless appeal to Hitler. Congress, however, rejected the president's proposal to amend the Neutrality Act, which was not in fact revised until Nov. 1939. It then became permissible for the U.S. to sell arms to those nations able to pay for them in cash and to transport them in their own or other non-Amer. ships. There was still a strong isolationist feeling, but Canada was already at war, and there was the prospect of Great Britain continuing the war from there if the U.K. were overrun. The U.S.A. and Canada entered upon joint measures of defence. A Permanent Board of Defence was set up with F. H. La Guardia, mayor of New York, at the head of the U.S. delegation. Two years earlier Roosevelt had promised Amer. aid if Canada were invaded, for this was consistent with the Monroe Doctrine (q.v.). The common ground of both isolationists and interventionists was the need to rearm the U.S. and re-equip its forces. By the autumn of 1940 the U.S. was practically on a war footing. A National Defence Advisory Committee had been set up in May, which was later replaced by an Office of Production Management of which W. F. Knudsen was director-general. For the first time in Amer. hist. military conscription was introduced in peace-time. The president showed that preparedness transcended politics,

and in June 1940 appointed 2 Republicans, H. L. Stimson and Frank Knox, to the posts of secretary of war and the navy respectively. Amer. sympathy was on the side of the Allies, and the Battle of Britain encouraged the U.S.A. to send all aid to Great Britain 'short of war.' A valuable measure of aid (Sept. 1940) was the transfer of 50 destroyers from the U.S. to the Brit. navy in return for a 99-year lease of bases in Newfoundland, the Bahamas, Jamaica, and elsewhere in the W. Indies. With the fall of France and the Netherlands, the U.S.A. warned Germany that the transfer of colonies in the W. hemisphere from one non-Amer. power to another would not be tolerated. As a consequence a Pan-Amer. Conference began (21 July 1940) to consider moves to withstand any Ger. effort to gain control of Fr. and Dutch ters. in S. America.

The year 1940 was election year. Both Republicans and Democrats supported the president's foreign policy and were united in the wish to hasten Amer. preparedness. The election was therefore fought on domestic issues. Roosevelt, departing from tradition, was nominated for a third term. Roosevelt gained a larger majority than anticipated, polling 27,243,466 votes against Willkie's (q.v.) 22,304,755. Roosevelt's entry upon a third term was marked by the Lend-Lease (q.v.) Act, which was presented to Congress on 6 Jan. 1941 and became law on 11 Mar. In spite of anti-Russian feeling, Lend-Lease credits were granted to Russia after the Ger. invasion on 22 June. By that time Roosevelt had declared a 'state of unlimited national emergency' (27 May). Amer. expeditionary forces were sent as a protective measure to Greenland, Iceland, Dutch Guiana, and elsewhere. On 14 Aug. the terms of the Atlantic Charter (q.v.) were announced, following a secret meeting between President Roosevelt and Churchill on a battleship in mid-Atlantic. The Amer. defence policy was hindered by labour disturbances during the year (1941). There was considerable agitation for anti-strike legislation, but the president was against this.

The Entry of the U.S.A. into the Second World War. Meanwhile, Japan's adherence to the tripartite Pact with Germany and Italy was giving concern in Washington. The Trade Agreement with Japan had lapsed (26 Jan. 1940), and had not been renewed. During 1941 relations became critical after the Jap. occupation of Siam (Aug. 1941). Diplomatic conversations were conducted in Washington between the president and the Jap. ambas. Adm. Nomura, aided by the special envoy, Mr Kurosu, sent by the Jap. premier, Gen. Tojo. Behind this diplomatic screen Japan prepared for war, and on 7 Dec. 1941 struck from the air against the Amer. naval base at Pearl Harbor (q.v.), Hawaii, crippling the U.S. Pacific Fleet and giving Japan naval supremacy. On 11 Dec. Germany and Italy also declared war on the U.S.A. Shortly afterwards Churchill went to Washington to confer with the president.

Pearl Harbor was followed by an attack on the Philippines, Hong Kong, and the Malay Peninsula. The Philippines were occupied by the Japanese by the end of May, 1942. The effect was to release a tremendous production drive, and this was encouraged as the year progressed by naval successes in the Coral Sea and off Guadalcanal (*see* NAVAL OPERATIONS IN SECOND WORLD WAR).

Various boards were created to further the war effort, notably the War Production Board, with Donald Nelson as chief executive, and the Economic Stabilisation Board, with J. F. Byrnes at the head. The aim was to create an armed force of 10,000,000 men, but the drafting of recruits caused a shortage of labour in industry. In April 1943 the president announced an economic programme to stabilise the cost of living. The Emergency Price Control Act was followed by an order issued by Leon Henderson, head of the Office of Price Administration, fixing maximum retail and wholesale prices. In spite of war taxation, increased income tax, and the increase in the National Debt, inflation became a problem. This was met by the Anti-Inflation Act, designed to fix the level of wage-rates as in Sept. of that year. In Europe the U.S.A. maintained diplomatic relations with the Fr. Gov. at Vichy, but supported the occupation of Madagascar by the British in May 1942. The U.S. landings in N. Africa followed in Nov. under the command of Lt.-Gen. Eisenhower (*see* AFRICA, NORTH, SECOND WORLD WAR, CAMPAIGNS IN). The next stage in war diplomacy was the conference at Casablanca (q.v.) in Jan. 1943, the first time in the hist. of the U.S.A. that the Amer. president was away from the country in war-time.

The Congressional elections in 1942 had resulted in Republican gains, and this marked a growing opposition to the liberal tendencies of the Roosevelt administration. The Anti-Inflation Act of 1942 was swept away, and efforts to control spending and to tax war profits were rebuffed. The cost of living rose sharply, bringing protests from organised labour. The coal strike of May 1943 was the occasion of anti-strike legislation passed hurriedly over the president's veto. Domestic conflicts, sharpened by the approach of the presidential elections in 1944, did not, however, seriously hamper the war effort. In foreign affairs Roosevelt's prestige was high. After his return from the Teheran conference, Roosevelt in his ann. message to Congress (11 Jan. 1944) called for a National Service Law, backed by laws to tax war profits, control the cost of food, and stabilise prices. Congress was not responsive. It was not until July, however, that Roosevelt announced that he would stand for a fourth term. By that time domestic policy receded before the events in Europe, following the Allied invasion in France in June. It was against this background of war that the election was fought. Roosevelt was renominated, with Senator Truman as the vice-presidential

candidate in place of Henry Wallace (q.v.). The Republican candidate was T. E. Dewey (q.v.), Governor of New York. In the elections in Nov. Roosevelt's popular vote was 25,602,505 and Dewey's 22,006,278. Foreign policy had been kept outside party politics, and no political capital was made out of the not very successful outcome of the conference at Dumbarton Oaks (q.v.). When the new Congress met in Jan. 1945 Senator Vandenberg (q.v.), the Republican leader, gave the Dumbarton Oaks plan his support. Then followed the conferences at Yalta (q.v.) between Roosevelt, Churchill, and Stalin. Meanwhile, the U.S.A. and the Latin-Amer. countries had confirmed Amer. solidarity in a declaration of mutual assistance, known as the Act of Chapultepec (6 Mar. 1945). Soon after the Yalta Conference, invitations were issued by the U.S.A., Great Britain, and the U.S.S.R., to 51 nations to take part in a conference to be held at San Francisco to discuss the future of the world organisation sketched out at Dumbarton Oaks. The opening of the conference on 25 April was overshadowed by the death of Roosevelt. Harry S. Truman, vice-president, succeeded to the presidency. The U.S. delegation, as nominated by Roosevelt, consisted of representatives of both the Democratic and Republican parties and some independent representatives. (*See* SAN FRANCISCO CONFERENCE.)

While the conference was in session, there came the news of the surrender of Germany on 7 May. The collaboration of the U.S.A. with Great Britain, the U.S.S.R., and France in the control of Germany emphasised the need for amicable relations, particularly between the U.S.A. and Russia. Truman dispatched Harry Hopkins (q.v.) to Moscow. This paved the way for the meeting of Truman, Churchill, and Stalin at the Potsdam (q.v.) Conference. On 28 July the Senate ratified the U.N. Charter (q.v.) by 90 votes to 2. It seemed that isolationism as a political force was ended. The Senate also ratified the Bretton Woods Agreements (q.v.), and decided that the U.S.A. should take part in the U.N. Food and Agriculture Organisation (q.v.). By 24 Oct. Byrnes, who had succeeded Stettinius (q.v.) as secretary of state on 30 June, was able to announce that all the necessary ratifications had been received. The Charter of the U.N. was now law.

Meanwhile, in the Far E. the atomic bomb (q.v., *also* HIROSHIMA and NAGASAKI) was instrumental in causing the surrender of Japan. The war was at an end, but the atomic bomb figured largely in the problems of peace; controversy over the control of it broke out at once. A Congressional Committee was set up and resulted in the MacMahon Bill, which became law on 1 Aug. 1946, establishing control by means of a civilian Atomic Energy Commission. In Nov. President Truman held a conference in Washington with the Prime Ministers of Great Britain and Canada, and by agreement with them

the problem of control was put to the U.N.

The U.S.A. after the Second World War. The end of the War also posed the question of the continuation of the Lend-Lease Act. On 21 Aug. 1945 Truman had announced that all outstanding contracts for Lend-Lease were cancelled unless the govs. concerned were willing to pay either in cash or by credit arrangements. As a result Lord Keynes and

and 1946 in the coal, automobile, steel, and electrical industries. Wages were bound up with prices, and the country was divided on the question of price control. The Price Control Act lapsed in June 1946, and by the end of the year the president had reluctantly to give way to the public agitation for the removal of controls. All controls were swept away except for those on rent, rice, and sugar. Against this domestic background



U.S. Information Service: American Embassy

AERIAL VIEW OF NEW YORK CITY, SHOWING FOUR U.N. BUILDINGS

Left to right: the General Assembly Building; conference area along the East River (background); Secretariat Building (tallest in foreground); and the library.

Lord Halifax headed a Brit. mission to Washington to discuss financial relations between the 2 countries. On 6 Dec. a final settlement was reached, the U.S.A. cancelling \$25m. and granting a loan of \$650m. to cover goods under contract or on the way. In addition, the Brit. mission negotiated a loan of \$3750m. (about £937,500,000) at 2 per cent interest repayable in 50 ann. instalments beginning in 1951.

In domestic affairs the struggle between management and labour was renewed. Trade-union membership had increased during the War, and attempts to reduce war-time wages or at least to resist any increase although prices remained high, were met by a series of strikes during 1945

of labour disputes, rapid demobilisation, and sometimes violent readjustment to peace-time conditions. U.S. foreign policy was conducted with the support of Republicans and Democrats alike. The secretary of state, Byrnes, represented the U.S.A. at a series of international conferences beginning with the General Assembly of the U.N. in Jan. 1946, and ending with the Peace Conference in Paris from July to Oct. Amer. foreign policy was largely united by doubt of Russia's intentions. Reacting from the unfavourable reception given by the U.S.S.R. to his plans for Four-Power control of Germany for 25 years, Byrnes in a speech at Stuttgart on 6 Sept. spoke in terms of Ger. unity and co-operation with the W.

Henry Wallace, U.S. secretary of commerce, denounced Byrnes's policy of resistance to Russia in the interests, as he averred, of Brit. imperialism, and resigned his office. This controversy aggravated the difficulties which the Democratic Party had to face in the Congressional elections in Nov. The Republicans gained a majority in both the House of Representatives and the Senate, the first Republican majority in Congress since 1930. In foreign affairs relations with Russia continued to occupy the State Dept. Early in the new year Byrnes was succeeded as secretary of state by Gen. George C. Marshall (q.v.). Events in Greece provided the occasion for an important speech by the president on 12 Mar., calling for Amer. aid to Greece and Turkey, and laying down the policy, later known as the Truman Doctrine, of helping any country in danger of submersion to a Communist regime. In May \$350m. authorised for relief work through U.N.R.R.A. (q.v.) was taken over to be administered direct by the U.S. Gov. itself in Europe and China. The way was thus prepared for the most significant event of the year, the speech by Gen. Marshall at Harvard Univ. on 6 June 1947 advocating U.S. aid to enable Europe to recover its normal economy. The speech was recognised as an invitation to the countries of Europe to examine their needs and concert a plan of development which Amer. magnanimity would make possible. The foreign ministers of the U.K., France, and the U.S.S.R. met in Paris in June to discuss Gen. Marshall's offer. Russian participation was later withdrawn. In spite of this a conference on European economic co-operation opened in Paris, and as a result of its recommendations the Economic Co-operation Bill was passed by Congress in April the following year. (See *EUROPE, European Recovery*; also *ORGANISATION FOR EUROPEAN ECONOMIC CO-OPERATION*.)

Meanwhile, the administration was at odds with Congress over its budget proposals earlier in the year (1947). Congress proposed a greater measure of tax reduction than the president considered safe in view of the possibility of inflation, but the congressional proposals were successfully vetoed. The president's veto was, however, unable to prevent anti-labour legislation, contained in the so-called Taft-Hartley Act, passed over the veto in June 1947. It imposed, *inter alia*, a period of notice before strike action or lock-out, banned the 'closed shop,' and restricted the unions' powers of compulsion over their members. Union funds were not allowed to be used for political purposes, and if unions wished to take advantage of the National Labour Relations Board they had first to certify that their officials were not Communists. Events in Europe, particularly the Communist *coup d'état* in Czechoslovakia in Feb. 1948, gave considerable impetus to the project for aid to Europe. In June the Senate adopted a resolution proposed by Senator Vandenberg, with the intention of giving aid to Europe in defence as

well as in economic affairs, and thus admitting the possibility of regional defence pacts within the framework of the U.N. Charter. Both the Republican and Democratic parties supported Truman's foreign policy, which was not therefore an issue in the presidential election due to take place later in the year (1948). At the Democratic convention in July Truman was nominated, but with no general conviction of success on the part of his supporters. Dewey was again nominated as Republican candidate, and the general expectation was that he would win the election. Truman, himself confident, confounded the prophets by polling 24,105,812 votes in the popular ballot against 21,970,005 for Dewey. Voting for Thurmond was 1,169,021 and for Wallace 1,157,172. These results gave Truman an overwhelming majority in the electoral college. The party position in both houses of Congress was reversed, the Democrats gaining a majority. The results put the President in a position to launch his 'Fair Deal' programme, which included the repeal of the Taft-Hartley Act (which repeal labour felt it had earned by its strenuous political support for the Democrats), and the introduction of civil rights legislation. He was, however, disappointed by the unwillingness of Congress to embark on either of these measures during 1949.

Meanwhile, in foreign affairs, the Vandenberg Resolution provided the initiative for consultations between the U.S.A. and the 5 Powers (the U.K., France, the Netherlands, Belgium, and Luxembourg), which on 17 Mar. 1948 had signed the Brussels Treaty (q.v.) of mutual assistance. Other countries (Italy, Portugal, Denmark, Norway, and Iceland), were invited to participate, and these 10 countries with the U.S.A. and Canada concluded the North Atlantic Treaty (see *NORTH ATLANTIC TREATY*), which was signed in Washington on 4 April 1949. This made the U.S.A. a party to the defence plan of W. Europe, and the next step was the Mutual Defence Assistance Act, which was signed by President Truman on 6 Oct. 1949. This authorised an expenditure of \$1100m. on military supplies to W. Europe in support of a co-ordinated defence plan which was to be worked out. The passage of the second year's appropriations for the Marshall plan, acceptance of the N. Atlantic Treaty and the Mutual Assistance Act for European defence, and the renewal of the Reciprocal Trade Agreements Act were features of a constructive foreign policy which afforded significant evidence of continued appreciation by both parties of the new position of the U.S.A. in world affairs.

There was a steady fall in industrial production between Oct. 1948 and the late summer of 1949, and unemployment reached a total of more than 3,700,000, and certain especially distressed areas were given preference in federal contracts to reduce unemployment. The economic position was further aggravated by a prolonged strike of the steel-workers, whose

aim, which was successful, was to secure a pension scheme comparable with that won earlier by the coal-miners. The steel-workers' victory encouraged other unions to press for pensions of \$100 a month at 65, and also prompted other companies, notably the Bell Telephone System, to follow the Ford Automobile Company in granting similar pensions.

On 27 Jan. (1950) the Mutual Defence Assistance Agreement between Britain and the U.S.A. under the N. Atlantic Treaty was signed in Washington and came into force immediately. Similar agreements were signed between the U.S.A. and France, Italy, Denmark, Norway, Belgium, the Netherlands, and Luxembourg. In the same month President Truman announced that he had decided to instruct the Atomic Energy Commission to continue its work on the hydrogen bomb.

The economic situation improved after Oct. (1949), and at the turn of the year there was a marked if short-lived boom, unemployment being appreciably reduced. Then came the Korean crisis, and on 19 July President Truman, in his message to Congress, asked for \$10,000m. for the Amer. armed forces and said he would request further sums for military aid to the Atlantic Pact Powers and other nations vital to Amer. security. He also reported to Congress that he had authorised the secretary of defence to call up as many men as might be needed, and he asked for the statutory limits of the strength of the armed forces to be removed.

The Korean War (1950). On 25 June Communist forces of N. Korea crossed the 38th parallel and launched an aggressive attack against the rep. of S. Korea (see KOREAN WAR). President Truman announced that Amer. forces would intervene, and immediately afterwards the Security Council of the U.N. decided to invoke military sanctions against the aggressors (see UNITED NATIONS, CHARTER OF THE). Brit. and Australian naval and air forces were placed at the disposal of Gen. MacArthur (q.v.), who assumed command of all U.N. forces. At the same time the Seventh U.S. Fleet was placed between Formosa (then in the hands of the Chinese Nationalists) and the mainland of China to prevent further acts of aggression against that is. by organised Communist troops. During June-July the U.N. troops were driven farther S., eventually centring their defence on Taegu, in positions extending over a perimeter of 125 m. from Pohang to Pusan. On 14 Sept. Amer. troops were landed behind the Communist lines at Inchon, in a major U.N. counter-offensive. Landings were made at sev. other points on the occupied coast, and other troops advanced N. from the Pusan perimeter. Troops in the N. had captured Seoul by the end of Sept., and the U.N. forces were on the Yalu R. itself by Nov., having crossed the 38th parallel a month before. In Jan. 1951, however, the Chinese intervened and launched a large-scale offensive against the U.N. army, sweeping deep into S.

Korea. But by April the U.N. forces had checked the advance and thrown the enemy back beyond the 38th parallel again. In April 1951 MacArthur was replaced by Gen. Ridgway (q.v.), who in turn was replaced, in 1952, by Gen. Clark (q.v.). Bitter fighting continued, while truce negotiations, begun in July 1951, took their slow course. One of the chief difficulties lay with the question of prisoners of war, the U.N. insisting on voluntary repatriation, the Communists refusing to agree to this. In 1953, when the way seemed to be clear for a truce, President Rhee (q.v.) made demands for guarantees from the U.N. which presented fresh difficulties. Finally, on 12 July, Rhee agreed to 'collaborate,' and an armistice was signed on 27 July.

Meanwhile, Truman's term of office had ended, and in 1952 his successor, Dwight D. Eisenhower (q.v.), had been elected, the first Republican president since Hoover. Eisenhower's nomination had been the subject of bitter controversy within the Republican party itself, the influential Right-wing preferring Taft (q.v.); once nominated, however, Eisenhower swept into office on a wave of popularity, easily defeating his Democratic rival, Adlai Stevenson (q.v.), himself of the highest calibre. The Republicans also gained control of Congress by a very narrow margin. Truman's second term had ended somewhat stormily. In Nov. 1950 an unsuccessful attempt on his life had been made by Puerto Rican nationalists. Through 1951 and 1952 inflationary pressures upset the domestic life of the nation, and there were sev. major strikes; there were disturbing cases of criminal corruption on a large scale, and the growing fear of Communist infiltration into the U.S.A. showed itself in retrograde and restrictive legislation such as the McCarran-Walter Immigration Act, enacted over Truman's veto. The Korean truce talks dragged on inconclusively.

Eisenhower's first term proved generally successful at home. The administration weathered a threatened economic recession 1953-4; a Korean cease-fire was signed in July 1953 (Eisenhower had visited Korea in Dec. 1952 in fulfilment of his election promises); and to the Negro pop. the decision of the Supreme Court in May 1954 that racial segregation in the public schools was unconstitutional was very naturally associated with the prevailing Republican administration. A more sinister feature of the period 1952-4 was the campaign against alleged Communist infiltration into Amer. public life and public service, conducted in particular by Senator McCarthy (q.v.). This reached a violence which disturbed many serious thinking Americans.

In 1954 the Democrats regained control of Congress, and after this date McCarthy's influence declined rapidly. Democratic critics of Eisenhower have suggested, with some justification, that the president found it easier to work with a Democratic Congress than with one controlled by his own party. By the end of

the president's first term the administration's most obvious domestic problem was the relatively weak position of the farming community in an otherwise flourishing economy (apart from isolated pockets of chronic unemployment, notably in the motor industry). In foreign affairs tension in the Far E. had apparently eased after the Geneva Conference of 1954 had ended the war in Indo-China, even though the U.S.A. continued to refuse recognition to the Communist gov. in Peking. In European matters, the death of Stalin was interpreted as the beginning of an easing of the 'cold war,' an idea strengthened in the popular mind by the meeting of heads of gov. (including Eisenhower and Bulganin) at Geneva in 1955.

In 1956, in spite of a recent hist. of serious illness, Eisenhower ran for the presidency again, once more with Nixon (q.v.) as vice-presidential candidate, and with Stevenson again his Democratic opponent. The last days of the election campaign were overshadowed by the anti-Communist rising in Hungary and by the renewal of the Egyptian-Israeli war—the latter incident resulting in an Anglo-Fr. military landing in Egypt.

Eisenhower's reputation as a peacemaker might now seem jeopardised; but the ominous foreign news possibly made many Americans cling more than ever to a president who seemed to have transcended party ties and to have become a national idol. Eisenhower was elected by a land-slide vote: but it was essentially a personal victory. His party failed to gain control of Congress; and his second term opened with the traditional Anglo-Am. alliance threatened by fundamental differences on Middle E. policy. During 1957–8 the traditional Anglo-Am. alliance was largely rebuilt, and the U.S.A. showed increasing willingness to take the initiative in Middle E. affairs. At the end of 1957 Eisenhower and Dulles attended the N.A.T.O. conference in Paris at which agreement was reached on the principle of the Amer. offer to supply an atomic stockpile and nuclear weapons to certain European member countries, but many European observers believed that the U.S.A. had in fact achieved far less than she had hoped for at this conference. During the year Amer. confidence was severely shaken by the launching of the 2 Russian 'sputniks': the subsequent launching of a small Amer. earth satellite, 'Explorer' (1 Feb. 1958), considerably restored this. The 1958 budget allowed for increased defence expenditure.

By the beginning of 1958 it was clear that the U.S.A. was experiencing a fairly considerable business recession; unemployment was mounting and consumption in certain categories of goods was falling.

ART. Amer. art, unlike that of the Amer. Indians (see AMERICAN INDIANS, *Arts and Crafts*), dates only from the third quarter of the 17th cent. The sparsity of the settlements and the lack of communication between them at this period meant that a general tradition was impossible; such work as existed, which was

mainly confined to New England, consisted of sev. individual enterprises. As the early artists generally came from the Eng. provs., their style was often slightly behind that existing in the cap. The different nationalities of the immigrants meant, however, that other artistic traditions—Dutch, Ger., Fr.—combined with the Eng. one; this mixture of styles has been a general characteristic of Amer. art.

The increased prosperity of the cities on the E. seaboard, from Boston to Charleston, encouraged artistic activity during the 18th cent., and an indication of the high standards of living can be seen in colonial silver, which though mainly following the Eng. example, had its own characteristics of simplicity and craftsmanship. The process of adapting European examples to colonial needs was evident in architecture (see AMERICAN ARCHITECTURE). The painters, though sometimes dabbling in religious works and landscapes, were mainly portraitists. The somewhat naïve imitation of the aristocratic court portrait found in the early part of the cent. surrendered at the hands of John Smibert (1688–1751) and Robert Feke (c. 1705–c. 1750) to a more direct manner of assessing character, which reached its climax in the sharp realism of John Singleton Copley (1738–1815) (q.v.). Copley is distinguished not only for his uncompromising portraits (e.g. 'Mrs. Boylston Harvard') but for his realistic treatment of historic events as in 'Death of Major Pierson' (Tate Gallery).

Although colonial art was mainly a reflection of that existing in Europe and was completely inspired by it, Benjamin West (1738–1820) (q.v.), who became president of the Royal Academy, exerted some influence in England, especially in departing from the habit of representing modern heroes in ant. dress. A wish to celebrate the growing pains of the Rep. was reflected in John Turnbull's (1756–1834) records of such notable events as the battle of Bunker Hill and the Declaration of Independence. Such heroes as Washington found physical immortality in the elegant yet shrewd work of Gilbert Stuart (1755–1828), who was the leader of a competent generation of portraitists. The romantic stirrings of the early 19th cent. affected America as well as England, though the struggles of Washington Allston (1779–1843) (q.v.) to finish his 'Belshazzar's Feast' indicated the general failure of the romantic approach in subject paintings, and a more genuine, if naïve, spirit marked the Sunday Painters—the so-called Primitives—who now began to come into their own. America itself was increasingly described by the landscape artists, notably by Thomas Cole (1801–48) (q.v.), who founded the landscape school which took its name from the Hudson R. formed 1811–76. A search for subject matter at home was not, however, sufficient; the second half of the cent. witnessed a determined desire to enrich the country's cultural heritage by the importation of old masters from abroad and by a frank study

of the masters of modern art. The sensitive approach to nature of the Barbizon School influenced George Inness (1825-94) (q.v.), the author of a series of gentle atmospheric landscapes. His work announced the appearance of a style, which like that of Copley or West in the past, was genuine and fresh, and which found its prin. exponents in Thomas Eakins (1844-1916) (q.v.) and Winslow Homer (1836-1910) (q.v.). This evolution was paralleled in architecture, and a specifically Amer. style of building—the skyscraper—sprang up in the Chicago of the 1880s (see AMERICAN ARCHITECTURE). The attempt to come to grips with Amer. life was not the only current in 19th-cent. art; it was accompanied by the attempt to escape from the realism and monotony of a materialistic society, which suggested the Gothic revival, the Amer. counterparts of the Pre-Raphaelites, the symbolist work of Albert Pinkham Ryder (1847-1905) (q.v.), and the eclectic culture of Boston. It was a period in which expatriation was the order of the day, and Whistler's 'Japonaiseries,' silhouette portraits, and nocturnes, played an important part in European painting. Whistler (q.v.) remains a great but isolated figure in art. John Singer Sargent (1855-1925) (q.v.) devoted the methods of big business to his portraiture of cosmopolitan society. The response to Fr. 19th-cent. art was considerable, as can be seen in Mary Cassatt (1855-1925) (q.v.), who added something of her own to Degas' style. The Impressionism of Monet inspired such charming members of the group, known as 'The Ten,' as Childo Hassam (1859-1935) and Theodore Robinson (1850-96). Their sensitive application of paint did not satisfy the robust realists of the 1900s, led by Robert Henri (1865-1929), and their sobriquet of 'The Ashcan School' indicated the nature of their art.

Since the 1900s many factors have encouraged the artist—the activity of such dealers as Alfred Stieglitz, the patronage of the New Deal, the foundation of the Whitney Museum and the Museum of Modern Art. The sculpture of Alexander Calder (b. 1898) and architecture of Frank Lloyd Wright (b. 1869) indicate that Amer. art now enjoys an international importance. Two main tendencies seem to emerge: one is a hearty interest among some painters in Amer. life, which may be illustrated by the vigorous work of George Bellows (1882-1925), Thomas Benton (b. 1889), John Steuart Curry (b. 1897), Reginald Marsh (b. 1898), and Grant Wood (1892-1942); and includes the 'symbolic realism' that appeared between 1940 and 1950. The other is a concern with modern expression and its means, seen, e.g. in the water colours of John Marin (b. 1872) or the severe 'still-life' of Georgia O'Keeffe (b. 1887), and in a number of abstract painters, much influenced by Europe.

LITERATURE. See AMERICAN LITERATURE.

DRAMA. See DRAMA, American Drama.

MUSIC. See AMERICAN MUSIC.

FILM. In 1895 the brothers Lumière (q.v.) gave the first public performances of motion pictures, and from that moment commercial cinematography was possible. Round about the turn of the cent. many experimenters were making and showing short films; but the commercial film as a money-maker may be said to have been born in the U.S.A. in 1903, when *The Great Train Robbery* appeared, having what was then the considerable length of 800 ft. This film was shown all over the U.S.A. for many years. Wherever a new nickelodeon (as the film houses were called) was opened, *The Great Train Robbery* was the first film to be shown there. From 1903 onwards the men whose names now indicate the big film-manufacturing companies—Warner, Fox, Laemmle, Goldwyn, Zukor, and Lasky began to enter the film industry. The films made by these early pioneers were slapstick and comedies and 'westerns.' The form of the 'western' has proved durable; the modern versions have a slickness and sophistication, but the shape remains. After the early 'westerns,' serial thrillers were in fashion. In 1914 David Wark Griffith, with some financial help but entirely on his own responsibility and in the teeth of the opposition of all the existing film corporations, supervised and directed a film which, appearing in the following year, was to change all over the world ideas about film-making. This was *The Birth of a Nation*. In 1916 Griffith made a second and equally important film, *Intolerance*. He thereby estab. the film as something more than vaudeville entertainment. What had commenced as one of the attractions of itinerant showmen became, through Griffith, a new art form existing in its own right and competing with the stage for the attention of the public; of equal importance was Charlie Chaplin, whose custard-pie films were true cinema.

With the introduction of sound, films became infantile again. From a chaos of vulgar noise the sound film was rescued by a series of great directors who worked to restore to the Amer. film its essentially cinematic qualities; outstanding are Robert Flaherty (*Man of Aran*, *Louisa Story*), Frank Capra (*It Happened One Night*, *Mr Deeds Goes to Town*), William Dieterle (*The Story of Louis Pasteur*, *All That Money Can Buy*), John Ford (q.v.) (*The Informer*, *Stage Coach*, *Grapes of Wrath*), Ernst Lubitsch (*The Merry Widow*, *Ninotchka*), Preston Sturges (*Palm Beach Story*, *Sullivan's Travels*, *Hail the Conquering Hero*), and Walt Disney (q.v.), whose enormous versatility has developed the film cartoon into such varied and popular entertainments as *Snow White* and *The Seven Dwarfs*, *Fantasia*, *Bambi*, *Peter Pan*, etc.

A milestone in the later development of the Amer. cinema is Orson Welles's *Citizen Kane*, 1941, whose innovations, such as the novel camera angles and gigantic close-ups, have had a far-reaching influence on subsequent technique. Other outstanding directors since the Second World War include Elia Kazan (q.v.) (A

Streetcar Named Desire, *East of Eden*) and John Huston (*Treasure of Sierra Madre*, *The African Queen*): while directors such as George Stevens (*Shane*, *Giant*), William Wyler (*The Best Years of Our Lives*, *Friendly Persuasion*), and Billy Wilder (*Sunset Boulevard*) maintain a consistently high level.

Cecil B. de Mille's *Samson and Delilah*, 1950, began a series of spectacular religious films which included *David and Bathsheba*, *Quo Vadis?*, and *The Robe*, the first film in Cinemascope, and later *The Ten Commandments*. Hollywood musicals should also be mentioned. Many of these are adapted from the stage (*Oklahoma!*, *The King and I*, *Gypsy* and *Dolls*), but some of those specially created for the screen have reached a high standard of freshness and originality (e.g. *An American in Paris*, *Seven Brides for Seven Brothers*). Broadway plays form the basis of many good films (*Born Yesterday*, *Come Back, Little Sheba*, *The Country Girl*, *Picnic*, *The Rainmaker*, *The Teahouse of the August Moon*), as also do novels (including *Gone with the Wind*, the longest film ever made, running for 3 hrs 40 min.). A new and promising trend is the adaptation of television plays for the screen (e.g. *Marty*, *12 Angry Men*, *The Bachelor Party*).

The Amer. film to-day is marked by an astonishing technical competence, the result of a div. of labour in which each separate technical process is in the hands of an expert dept. The industry continues to produce a substantial number of fine films of serious purpose, as well as those which are designed solely to entertain.

See also CINEMATOGRAF, particularly under THE SCREEN for the latest technical developments.

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United States of Brazil, see BRAZIL.

United States Steel Corporation was incorporated in the state of New Jersey in 1901. Its purpose was to combine a number of companies in order to achieve the benefits of a fully integrated steel operation from raw materials through a wide variety of finished products. U.S. Steel's facilities have been augmented from time to time in order to round out its operations and better to serve the changing demands for steel as America's economy continues to expand.

U.S. Steel's proportion of the total Amer. steel production declined more or

less steadily from 67 per cent in 1901 to about 30 per cent in 1955.

Units, standards, arbitrarily chosen, in terms of which quantities may be expressed. Scientifically, U.s. are of 2 kinds, viz. fundamental and derived. The fundamental U.s. are those in terms of which all others can be expressed. See METROLOGY; PHYSICAL UNITS.

Units, Electrical. In the electrostatic C.G.S. (centimetre, gramme, and second) system, unit charge is defined as that which repels an equal charge at a distance of 1 cm. in vacuo with a force of 1 dyne; Coulomb gives dimension (q.v.) from the equation $[force] = MLT^{-2} = [q]^2/\epsilon L^2$, $[q] = \sqrt{\epsilon M^{1/2}L^{3/2}T^{-1}}$ where ϵ is the permittivity of the medium separating the charges. The dimensions of all other electric quantities follow, e.g. current $[I] = \sqrt{\epsilon M^{1/2}L^{3/2}T^{-2}}$, charge per sec. In the magnetic system the inverse square law gives the dimension of unit magnetic quantity $[m] = \sqrt{\mu M^{1/2}L^{3/2}T^{-1}}$ and magnetic force = force per unit quantity $[H] = MLT^{-2}/\sqrt{\mu M^{1/2}L^{3/2}T^{-1}} = \frac{1}{\sqrt{\mu}} M^{1/2}L^{1/2}T^{-1}$. Maxwell's law $H = 0.4\pi nI$ for the magnetic force in a solenoid with n turns per cm. carrying a current I (amps.), establishes a relation between the 2 systems, and if a current is measured in both systems the dimensions are $\sqrt{\epsilon} M^{1/2}L^{3/2}T^{-2} = \frac{1}{\sqrt{\mu}} M^{1/2}L^{1/2}T^{-1}$, from

which $\frac{1}{\sqrt{\epsilon\mu}} = LT^{-1}$, the dimension of a velocity. The numerical value is the velocity of light in vacuo. A practical system that can be standardised for universal use must be based on quantities that can be accurately measured, or physical objects that can be reproduced. Such a system is based, by international agreement, on the ampere, defined as the current which deposits 0.001118000 gm. of silver per sec. in a silver nitrate volta-meter; the ohm, defined as the resistance at 0°C. of a column of mercury 106.300 cm. long, of uniform cross-section and of mass 14.4521 gm. From these, all other units are derived, but as a check the volt is compared with the e.m.f. of a Weston cell, which is taken as 1.018300V. The coulomb is 1 A sec., 1 V = 1 ohm A, 1 F = 1 coulomb/V, 1 W = 1 VA, 1 joule = 1 W sec., 1 henry = 1 V per A per sec. Multiples and submultiples are k (kilo) = 1000, M (mega) = 10⁶, m (milli) = 10⁻³, μ (micro) = 10⁻⁶, p (pico) = 10⁻¹². An 'absolute' practical system based on the metre, kg., sec., ohm (MKSA) was proposed by Giorgi at the convention of 1946, and has recently penetrated to the current text-books. The Giorgi system accepts the definition of the ampere and the ohm of the practical system but with some slight correction, due to recent accurate measurements. Field intensity is measured in volts per metre, and in other such units involving length or mass, the cm. and gm. are replaced by m. and kg. See also METROLOGY; PHYSICAL UNITS.

Unity of the Brethren, The, see MORAVIANS.

Universal, abstract conception formed by stripping a concrete percept of all accidentals, thus creating a concept which embodies the features common to all. Thus *man* in the abstract is a universal term, while an individual man is the particular. For the great medieval controversy as to the real existence of U.s., see NOMINALISM; REALISM.

Universal Declaration of Human Rights, see HUMAN RIGHTS.

Universal Language, see ESPERANTO; IDO.

Universal Postal Union, see POST OFFICE. Universalists, primarily those who hold the opinion first definitely upheld by Origen, that all men and even the devils themselves will finally be saved. This opinion, or a modified form of it which said that all men would be saved, was common in the early cents. and is not uncommon to-day. The name U. is also given to a sect founded in 1774 in America by John Murray (b. England 1741, d. Boston, Massachusetts, 1815). The Amer. Universalist Church had over 50,000 members in 1950.

Universe, The, see COSMOGONY; COSMOLOGY; NEBULAR HYPOTHESIS; SPACE; TIME.

'Universe, The,' weekly journal founded by Dennis Lane in 1860 for the reporting of Catholic news. It covers Church topics in every part of the world, Papal pronouncements, the Catholic attitude to social and political problems, personal paragraphs, literary and dramatic criticism, and includes a 3-page family feature.

Universities, originally from *universitas*, a term meaning any community or corporation; when devoted to learning the full title was *universitas magistrorum et scholarium*. At the end of the 14th cent. the word began to be used with the exclusive meaning of a lawfully recognised community of teachers and scholars and gradually replaced the older term *studium generale* (a centre of instruction for all). Their charters allowed schools other than cathedral schools to be opened, licensed their teachers, and were first granted by religious authorities. After the Reformation charters were increasingly granted by secular authorities, and to-day in the U.K. U. receive a Royal Charter which enables them to confer degrees and other privileges and promote education in the higher branches of learning. Originally the U. restricted themselves to the study of law, theology, and medicine. As early as the 9th cent. medicine was being taught in Salerno Univ. During the 12th and 13th cents. other great It. schools maintained this tradition. There was also a revival of legal studies at Pavia, and Bologna became recognised as the centre of civil and canon law. Paris Univ., whose organisation influenced all the central European U., including Oxford and Cambridge, grew out of the school opened by Wm of Champeaux during the first decade of the 12th cent. About this time many eminent scholars gathered in

Paris, and the reputation and inspiration of one of them, Abélard (*d.* 1142), did much to make Paris Univ. famous. Organised in 4 faculties, theology, canon law, medicine, and arts, the Univ. passed into the control of an oligarchy of teachers and officials, whilst its teaching functions passed to the associated colleges. By the 14th cent. there were some 40 colleges under secular or sectarian control, thus forming a federation rather like that existing in the U. of Oxford, Cambridge, and London. Each college had, however, less independence than is usual in England.

The origins of Oxford Univ. were similar: it grew out of schools centred on a nunnery and an abbey, and after 1168 allusions to Oxford as a *studium generale* become more frequent. No doubt educational activities were being carried out at this time in the neighbourhood of Cambridge; they were strengthened by a migration of students from Oxford in 1209. In both cases a unique and permanent feature of Eng. U. was estab. through the halls of residence, later known as colleges, which have retained a considerable measure of autonomy. The number of U. in Europe grew rapidly during the 14th cent. Charters were granted to Prague, Cracow, Vienna, Heidelberg, and Cologne, among others. The Reformation marks a great boundary line in the development of European U. Cambridge for a time became the centre of Puritanism in Elizabethan England, and although this tendency was suppressed both there and at Oxford, many U., Lutheran in outlook, were estab. in Europe. This was particularly the case in Germany through the 16th cent.; it was followed by a counter Reformation, in the course of which sev. Catholic institutions were opened.

The secularisation of Paris Univ. occurred as a consequence of the Fr. Revolution. In 1793 a decree of the Revolutionary Convention abolished the U. and colleges of the *ancien régime*; the new system of univ. organisation was promulgated by Napoleon I in 1808. The whole system of education under the univ. of France was to be controlled and directed by the State. Each of 17 regions was to have certain faculties; these became regional U. in 1896, the year after religious authorities were allowed some freedom to re-establish faculties under their control.

Development of U. in England had to wait until the 19th cent. A proposal to open a univ. in Durham by Cromwell came to nothing. Entry to Oxford and Cambridge was restricted by denominational tests, which were abolished only in 1871, although the range of studies at both was gradually extended through the 18th cent. and written examinations were introduced. In 1828 a group of dissenters representing all denominations opened the univ. of London. This was soon followed in 1831 by King's College, whose express purpose it was to promote the doctrines and duties of the Church of England and Ireland. In 1836 the 2 colleges became constituent members of the Univ. of London, whose functions were restricted

to conducting examinations and conferring degrees. The other stimulus to univ. development came from the need for men capable of running the nation's growing commercial and industrial activities. The civic U. of Manchester, Newcastle, Sheffield, Leeds, and Birmingham were created to meet local needs and supported by local benefactions. From being colleges primarily concerned with technical and professional studies they grew into modern U. with a full range of faculties. Fourteen of them are able to confer first and further degrees; 3 Univ. Colleges prepare students for London external degrees and await their own charters. The Univ. College of North Staffordshire estab. in 1949 does not organise its studies in the traditional manner and is able to confer B.A. degrees. Three of the Scottish U. were founded in the 15th cent., the fourth, Edinburgh, in the 16th cent.

The inclusion of technological studies (to be contrasted with the pure sciences) within the full univ. framework is, as far as Europe is concerned, peculiar to the U.K. Elsewhere separate institutions providing courses at the highest level in technology have grown up—the Ger. *Technische Hochschulen* quickly reached the status of U. in the late 19th cent. Everywhere the most significant change was the rapid advance made in the study of natural science. Technical U. have grown up in sev. parts of the Commonwealth. Meanwhile developments in the U.S.A. have been startlingly different from those in Europe. The original settlers were quick to establish colleges for the preparation of the clergy. Harvard, Yale, William and Mary, Princeton, King's (later Columbia), Brown, Rutgers, and Dartmouth were all estab. before 1750. A more liberal programme of studies was introduced by Benjamin Franklin in the univ. of Pennsylvania. The older U. retain even to-day some of the conservatism of the European U., but their curricular offerings have been modified by the pressure exerted by the large State U. These institutions were originally estab. with the aid of Federal funds to meet the agric. and industrial needs of the country's expanding economy. Grants were made for technological studies, this investment encouraged further local investment, and to-day the State U. offer a wide range of professional courses taken to the highest level. They are extremely wealthy and with other institutions of higher learning (about 1800 in all) cater for about a quarter of the age group. This compares with about 4 per cent in England and Wales. There is no doubt that professional and vocational studies are becoming increasingly popular in the U.S.A.: nearly 20 per cent of the first degrees awarded are in education, some 14 per cent in business and commerce, nearly 10 per cent in engineering, and 5 per cent in applied biology. The percentage of first degrees in the arts has dropped to less than 10. This emphasis on professional, technical education is apparent in the U.S.S.R.

By contrast in Great Britain 44 per cent of univ. students continue to graduate in arts subjects, 21 per cent in pure science, whilst engineering claims some 12 per cent.

The dangers of professionalism and proliferation of subjects (including, for example, courses in 'practical poultry raising,' 'book reviewing,' etc.) have been stressed in Europe and by a number of people in the U.S.A. Similarly, the lowering of 'standards'—the result of allowing so many students to attend college—is deplored. These critics of modern tendencies argue that the broad liberal education traditionally provided in U. will be lost, leaving the professionally trained graduates narrow specialists unable to play the same role in national affairs. The argument against U.S.A. developments based on 'lowering standards' should be treated with caution. It is true that there are wide variations in the quality of the institutions of higher learning, and a distinction should be made between degree-granting colleges and U. proper. The latter have well-developed post-graduate schools, whose students reach a very high standard of scholarship. Many of the former have grown from the early teacher-training or 'normal' colleges, and are themselves now evolving into fully developed U. Despite the diversity, perhaps some 200 institutions rank with the U. of England and the rest of Europe.

Commonwealth Universities have followed the pattern of the Eng. civic U. In 1957 there were 121 of them. In the Dominions all the U. were estab. by Acts of the State Legislatures, but by statute and royal charter they are self-governing academic corporations. The Australian National Univ. at Canberra was founded by an Act of the Commonwealth of Australia in 1946, in the first instance for the development of research institutes. The Asquith Commission on Higher Education in the Colonies (Cmd. 6647, 1945), its committee for the W. Indies (Cmd. 6654, 1945), and the Elliott Commission on Higher Education in W. Africa (Cmd. 6655, 1945) gave impetus to univ. development in the non-self-governing territories. The 5 univ. colleges, Ghana (1948), Ibadan, Nigeria (1948), E. Africa (1949) (formerly Makerere College), Rhodesia and Nyasaland (1952), and W. Indies (1946, charter 1949) prepare their students for univ. of London degrees. The well-estab. U. of Hong Kong and Malta have been strengthened, and the univ. of Malaya (granting its own degrees) was founded in 1949 by the fusion of 2 existing colleges in Singapore by ordinances of the govts. of Malaya and Singapore.

British University Expansion 1945-56. Sev. committees at the end of the War urged that the number of univ. graduates should be increased. The Barlow Committee Report on Scientific Manpower (Cmd. 6824, 1946) recommended that the output of science graduates should be doubled by 1960. This target was achieved, but the country remained very

short of scientists, and in particular of technologists (see Technical Education, Cmd. 9703, 1956). The Percy Committee Report on Higher Technological Education (H.M.S.O., 1945) emphasised the great need for technologists. The expansion has not been able to keep pace with the demand. The total number of univ. students has grown from some 50,000 in 1945 to about 80,000 in 1955. Each year the Univ. Grants Committee publishes *Returns from Universities and University Colleges for the Academic Year*. By this committee the quinquennial univ. requirements are assessed and recommendations made on them to the Treasury. The Treasury grant has now risen to some 67 per cent of univ. income. It has been accompanied by remarkably little interference by the gov. with the traditional freedom enjoyed by Brit. U. See also articles on individual U. and colleges.

University City, city of St Louis co., E. Missouri, near Mississippi R., suburb W. of St Louis. It was incorporated in 1906. Pop. 39,893.

University College, Oxford, dates from the year 1249, when Wm of Durham, Rector of Wearmouth, bequeathed a sum of money to maintain certain graduates of the univ., the institution obtaining the name 'The Great Hall of the University,' which is still part of its designation. Whether Wm of Durham intended by his bequest to initiate a major change in the character of Oxford life is unknown; but it seems certain that in the generation following his death (1249) the collegiate system was instrumental in shaping it. In the beginning his foundation was probably confined to clerks from Durham.

University College, school of London Univ. (q.v.), founded 1826, and opened in 1828 as the 'univ. of London,' incorporated as U. C., London, in 1836. U. C. was the first constituent college of London Univ., in which it was incorporated in 1907, and comprises the faculties of arts (including economics), laws, science, engineering, and medical sciences. Included in it are the Slade School of Fine Art, the School of Librarianship and Archives, the Bartlett School of Architecture, and the dept of Town Planning; the Francis Galton Laboratory for Natural Eugenics is now incorporated in the dept of eugenics. U. C. has administered the univ. observatory (Mill Hill Park) since 1951, the Nuffield Research Garden (Regent's Park) for the dept of botany since 1953, while the Blakeney Field Station is maintained by the dept of botany. The college possesses one of the best teaching collections of Egyptian antiquities in the world, amassed by Sir W. M. Flinders Petrie (q.v.), who also inaugurated the chair of Egyptology there. In 1953 a centre was founded for research in the field of communications. The present buildings have developed on the original site in Gower Street, and there are now 3400 students.

University College Hospital, founded in 1833 by University College, London. By the Transfer Act of 1905 a separate

corporation was estab. for the administration of the hospital and medical school. Considerable extensions were made in 1926 and 1937. In 1948 the hospital was designated a teaching hospital incorporating St Pancras Hospital (ex L.C.C.) and the Hospital for Tropical Diseases; the medical school became an independent teaching school of the univ. with its own council.

University College of North Staffordshire, see NORTH STAFFORDSHIRE.

University College School, public school for boys at Hampstead, London. Founded in 1830 as 'The London University School,' the name was modified some years later. The school was transferred to Hampstead in 1907. A preparatory dept is maintained.

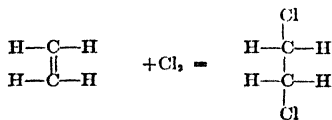
University Settlements, see SOCIAL SETTLEMENTS.

U.N.O. (United Nations Organisation), see under UNITED NATIONS, CHARTER OF THE.

Unreason, Abbot of, see ABBOT OF UNREASON; FOOLS, FEAST OF.

Unruh, Fritz von (1885-). Ger. author, b. Koblenz, of a family of auct Ger. nobility, with a high military tradition. He became a Guards officer. In 1910 he wrote a drama *Offiziere* (pub. 1911), opposed to the sentiments and traditions of Ger. militarists and nationalists. He resigned his commission in 1912. He entered politics, but left Germany with the advent of Hitler, and finally settled in America in 1941. His later works include *Miss Rollschuh* (a comedy), and the novels, *Der nie verlor*, 1949, and *The End is not yet*, 1947. See studies by F. Engel, 1922, and A. Kronacher, 1946.

Unsaturated Compounds, in chem., compounds that will form derivative substances by direct addition. Thus ethylene, C_2H_4 , combines directly with chlorine to form ethylene dichloride: $C_2H_4 + Cl_2 = C_2H_4Cl_2$; and acetylene, C_2H_2 , will combine directly with bromine to form acetylene tetrabromide, $C_2H_2Br_4$: $C_2H_2 + 2Br_2 = C_2H_2Br_4$. Ethylene and acetylene are therefore said to be unsaturated, as contrasted, for instance, with methane, CH_4 , which can form derivatives only by substitution. Thus, when methane reacts with chlorine, a hydrogen atom is removed for every chlorine atom that enters: $CH_4 + Cl_2 = CH_3Cl + HCl$; $CH_3Cl + Cl_2 = CH_2Cl_2 + HCl$; and so on. In methane the pairs of electrons forming each bond redistribute themselves in space to form 4 similar valency bonds of equal strength. In ethylene the double bond is not composed of 2 similar bonds due to the different types of pairs of electrons forming those bonds. One bond is hence weaker than the other.



Unsaturated.

Saturated.

An illustration of U. C. in action is the

use of linseed oil as a drying oil. Linseed oil is an U. C. and, though the reactions involved in the drying of oil films are not completely understood, oxygen is absorbed by addition to the double bonds, until solidity is reached.

Unst, is. of the Shetland (q.v.) Is., most northerly of the Brit. Is., 40 m. N.E. of Lerwick and separated from Yell (q.v.) by Bluemull Sound. There are 2 anchorages, and fishing and knitting are carried on. Area 46½ sq. m. (including the is. of Uyea and Muckle Flugga, the latter with a lighthouse); pop. 1250.

Untermeyer, Louis (1885-), Amer. poet and critic, b. New York. Educ. at the De Witt Clinton High School, he went into his father's jewellery business. Vols. of his verse include *First Love*, 1911, *Challenge*, 1914, *The New Adam*, 1920, *Roast Leviathan*, 1923, and *Burning Bush*, 1928. *Collected Parodies*, 1926, contains witty imitations of contemporary poets. His critical works include *American Poetry Since 1900*, 1923, and *Forms of Poetry*, 1926, and he compiled some 10 poetry anthologies, the most important being *Modern American Poetry*, 1919, and *Modern British Poetry*, 1920, both of which were later revised. From 1934 to 1937 he was poetry editor of the *American Mercury*. He married successively Jean Starr and Virginia Moore, both poetesses, Esther Antin, a lawyer, and Bryna Ivens.

Unterwalden, one of the forest cantons of Switzerland, lying to the S. of the Lake Luzern. It is divided into Obwalden (area 189 sq. m.) and Nidwalden (area 106 sq. m.). Pasturage and dairy work are the chief industries. It was one of the founders of the Confederation; Sarnen and Stans are the caps. Total pop. (1955) 42,500, Rom. Catholics.

Untouchables, a term usually applied in India to Hindus of the lowest social status who do not belong to any caste. They are untouchable to the caste Hindus, who consider themselves polluted by their touch and must purify themselves if they do come in contact. They are now more frequently called scheduled castes. The Gov. of India are doing as much as can be done by legislation to break down the prejudice. See B. R. Ambedkar, *The Untouchables* (New Delhi), 1949.

Unwin, Sir Raymond (1863-1940), architect and town-planner, b. Rotherham, was trained as an engineer; but turned to architecture and began practice in 1896 with Barry Parker. In 1901-3 they planned the Rowntree Estate near York, and in 1903 won the competition for planning the first Garden City at Letchworth, Herts. In 1908 Unwin planned the Hampstead Garden Suburb. From 1914 to 1928 he was employed as adviser on town planning by various gov. depts. In 1909 he pub. a standard book on *Town Planning in Practice*; and came to be known as 'The Father of Eng. Town Planning.' He was President R.I.B.A. 1931-3, and was awarded the R.I.B.A. Royal Gold Medal in 1937.

Unwin, Sir Stanley (1884-), publisher, Chairman of George Allen & Unwin, Ltd.,

publishers. He was educ. at Abbots-holme and in Germany, and after early experience in German bookselling and in printing, joined the publishing firm of T. Fisher Unwin in 1903, of which he later became manager. Leaving the firm in 1912, he travelled round the world, visiting booksellers, librarians, and editors, and on 4 Aug 1914 founded the firm of George Allen & Unwin to take over the assets of George Allen and of Swan Sonnenschein. Having progressive leanings from the first, the firm attracted many authors whose names became famous in the world of ideas, among them Bertrand Russell, J. A. Hobson, Ramsay Macdonald, Lewis Dickinson, Gilbert Murray, Harold Laski, R. H. Tawney, L. T. Hobhouse, Graham Wallas, etc. U. is past President of the International Publishers Congress and of the Publishers Association of Great Britain and Ireland; is on the governing body of the British Council, and is a director of The Equitable Life Assurance Society. He received the Hon. LL.D. of Aberdeen Univ. in 1945 and was knighted in 1946. His book, *The Truth about Publishing*, 1926 (6th ed. 1950), is the standard work on the subject.

Up Holland, urb. dist. of Lancs, England, 4 m. from Wigan. Brick-making and agric. are the chief industries. Here is St Joseph's College, seminary for the Rom. Catholic archdiocese of Liverpool. Pop. 6450.

Upnishad, see VEDANTA.

Upas-tree, see ANTARIAS.

Upchurch Ware, a variety of coarse Rom. pottery, usually grey in colour and ornamented with burnishing and applied dots, which has been widely found at Upchurch on the Medway in Kent and at places in Essex. There does not seem to be enough evidence that its manuf. formed a really important local industry.

Uphall, par. and vil. of W. Lothian, Scotland, on Brox Burn. There are paraffin works, and oil-shale is mined. Pop. (with Broxburn) 9530.

Upminster, see HORNCHURCH.

Upolu, see SAMOA.

Upper Austria, see AUSTRIA, UPPER.

Upper Canada, see ONTARIO.

Upper Darby, township of Delaware co., SE. Pennsylvania, U.S.A. It is chiefly residential (SW. of Philadelphia), with some manufacturing of aircraft parts, plastic, wood, and rubber products, furniture, and communications equipment. It was incorporated in 1907. Pop. 84,951.

Uppingham, rural dist. and mkt tn of Rutland, England, 6½ m. S. of Oakham. Here is U. School (q.v.); one of the original school buildings is in the churchyard. The church is partly 14th cent.; Jeremy Taylor held the living from 1638 to 1643. Pop. (dist.) 6700.

Uppingham School, public school for boys, founded in 1584 by Archdeacon Johnson at Uppingham, Rutland. Under the Rev. Edward Thring, headmaster from 1853 to 1887 and founder of the Headmasters' Conference, the school was expanded and developed to reach its present position.

Uppsala, or Upsala. 1. Län of Sweden, in the E. central part. Iron ore and granite are produced, and there is much forest. Area 2056 sq. m.; pop. 149,800.

2. Cap. of the above, on both sides of the R. Fyris. The old tn is on the W. bank and the new on the E., the 2 being joined by 5 bridges. It is a tn of great



Swedish Tourist Traffic Assoc.

UPPSALA: THE OLD CHURCH

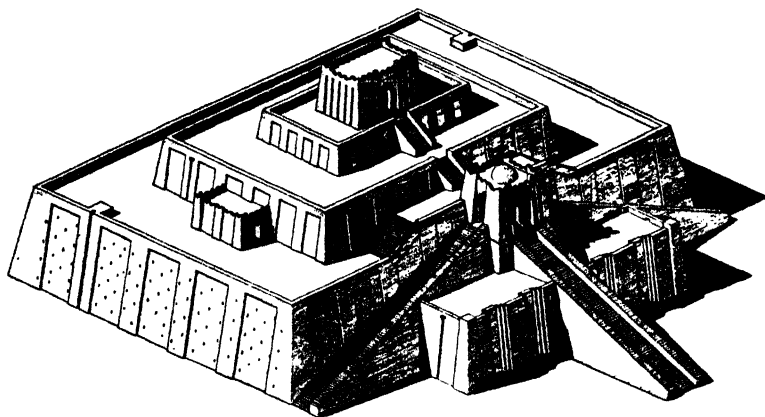
(12th Century).

historical interest. Its univ., with which Linnæus (q.v.) was connected, was founded in 1477, and the new buildings were erected in 1879-86. It has a famous library, containing some 700,000 books, and 17,000 MSS. In the Gothic cathedral (1230-1435) are buried Gustavus I, Linnæus, and Swedenborg. The cathedral is the greatest surviving achievement of Swedish Gothic architecture: its S. door is especially notable. U. is the metropolitan see of the Swedish State Church. Near U. there is an academy of agriculture. Some 2 m. N. at Old U., once a centre of pagan worship, are burial mounds of early kings. Pop. 70,142.

Ur, anct city, the Biblical 'Ur of the Chaldees', bp. of Abraham, formerly on the R. Euphrates near the Persian Gulf, mod. Tell el-Mugayyar ('Mound of Bitumen') 6 m. W. of Nasiriyah (Iraq). Ur was an influential capital of a Sumerian city-state. First excavated by J. E. Taylor in 1854 and then by Campbell Thompson and Hall (1918-19), the main excavations were made 1922-34 by a joint expedition of the Brit. Museum and the Museum of the univ. of Pennsylvania under C. L. (Inter Sir Leonard) Woolley (q.v.). Remains of several prehistoric phases, one named after Al 'Ubaid (4 m. N.), Uruk, and Jemdet Nasr were found in a number of pits dug down to virgin soil. Pottery and objects of the Ubaid periods were found interrupted by an 8-ft. deposit of clean water-laid clay which Woolley considers to be evidence of the Flood recorded in Biblical and Babylonian texts.

A remarkable series of 16 brick and stone built tombs of the First Dynasty of Ur (c. 2500 BC) included those of a warrior Mes-kalam-shar and of a queen Shub-ad (q.v.). As many as 80 attend-

Sin, Ur was most prosperous under its Sumerian Third Dynasty (2070-1980 BC), founded by Ur-Nammu builder of the first temple tower or *ziggurat* (q.v.) and many temples and buildings dedicated



Scale of 0 5 10 20 30 40 50 60 70 metres

British Museum

THE ZIGGURAT OF UR-NAMMU RESTORED: ISOMETRIC PROJECTION

ants were buried with 1 occupant, together with many fine objects of gold, silver, and copper. These are now in the Iraq, Brit., and Philadelphia Museums.



British Museum

MESKALAMSHAR HELMET

Some interpret these 'Royal Tombs' as part of ritual burials of priests and priestesses. After a period under the Semites, Sargon of Agade, and Naram

principally to Nannar (or Sin, q.v.), the moon god. Many thousands of inscribed clay tablets illustrate the prosperous life of the city, both at this time and in the later Babylonian, Kassite, and Chaldaean periods. Nebuchadnezzar II extensively rebuilt the temple area and the *ziggurat*, the lower 2 stages of which dominate the present ruins. Nabonidus (556-539 BC), the last Chaldaean king, dedicated his daughter, Bel-shalti-nannar, to be the high-priestess of the moon-god Sin. Details of her estab., museum, etc., have been found. A few Persian houses seem to have been occupied until as late as the 4th cent. BC, when the site was abandoned following a change of course by the R. Euphrates. For a record of his 12 years' work see Sir Leonard Woolley, *Excavations at Ur*, 1954. For full details see the Brit. Museum publications series *Ur Excavations* and *Ur Excavations Texts* (1936-56). See also BABYLONIA; CHALDAEA.

Uraemia (Gk *ouron*, urine; *haima*, blood), toxic condition caused by renal failure. As the derivation from the Gk words suggests, in U. the waste products normally excreted by the kidneys into the urine are retained in the blood. Urea, which is an end product of protein metabolism, is one of these products, and a way of measuring the degree of U. is to estimate the urea in the blood. Conversely, the amount of urea in the blood is a measure of the efficiency of kidney function. Normally the blood urea is

about 20 mg. of urea in every 100 ml. of blood. In cases of severe U. it may rise to 200-300 mg. The blood 'electrolytes' (sodium and potassium salts) are also increased in uraemia. The most usual cause of uraemia is kidney failure due to kidney disease (see NEPHRITIS). It also occurs in nephrosis (q.v.). It may also occur in conditions in which there is a sudden circulatory failure or reduction in blood volume, such as in haemorrhage, profuse diarrhoea and vomiting, and severe surgical shock. These are referred to as extrarenal causes of U., and since in them the uraemia is not essentially due to kidney disease, recovery occurs if the causative condition improves. In renal failure due to kidney disease, however, U. tends to be progressive. The symptoms of U. vary from malaise, headache, dyspepsia, and nausea in the mild case to vomiting, vertigo, bad headache, and disturbance of vision, and later convulsions and coma in the severe case. The patient is literally poisoned by his own waste products.

Ural (until 1775 Yaik), navigable riv. in Russia forming the boundary between Europe and Asia. It rises in the U. Mts and flows S., then W. and again S. into the Caspian Sea. Length 1580 m. The chief ports are Ural'sk and Gur'yev. From the 17th cent. the banks of the U. were colonised by Cossacks (q.v.).

Ural-Altaic Linguistic Family. Languages belonging to this family are spoken over vast stretches of Asia and Europe by c. 60,000,000 speakers. They fall into various sub-families or branches: (1) *Finno-Ugrian* comprising Finnish (c. 4,000,000), Estonian (c. 1,000,000), Lapp (c. 30,000), Zyryan or Syryan or Komi (c. 250,000), Votjak (c. 275,000), Mordva (c. 1,000,000), Cheremiss, etc., as well as Hungarian or Magyar (c. 13,000,000), Szekler (c. 450,000), Samoyedic, Vogul, and Ostyak. Many scholars reject the unity of the U.-A. family, and prefer to consider the Finno-Ugrian languages as an independent group. (2) *Turco-Tatar* comprising modern Turkish (c. 18,000,000), some extinct anc't languages of Central Asia, such as the Early Turki of the Kōk Turki inscriptions (see under ALPHABET), Uighur, a great number of Turki and Tatar languages and dialects nowadays spoken in various Soviet reps. and in Central Asia (Kazan Tatar, Azerbaijani, Gagatai, Kashgar, Crimean Tatar, Uzbek, Kumuk, Kirghiz, Bashkir, Turcoman, Karafite, Chuvash, Yakut, etc.), extinct Tatar languages, and dialects of Central and N. China, etc. (3) *Mongolian branch* including Mongolian proper or Khalkha (c. 2,000,000), Kalmuck (c. 200,000), and Buryat (c. 300,000). (4) *The Tungus or Tungus branch*, including Manchu (c. 500,000). According to some scholars, Japanese (c. 80,000,000), and Korean (c. 30,000,000), and according to others, also the Pravidian languages (see LINGUISTIC FAMILIES), would belong to the U.-A. family. The main characteristics of the U.-A. L. F. are agglutination (see LANGUAGES, CLASSIFICATION OF), and a certain 'vowel harmony'.

Ural-Kuznetak Combine, large industrial project carried out in Russia in the 1930s, aimed at combining the iron ore of the Urals and the coking coal of the Kuznetak Basin (q.v.) (distance over 1200 m.) for the production of iron and steel. The idea was mooted before the First World War, and the first practical steps made during it, but the final decision on the U.-K. C. was taken at the 16th Congress of the Communist party in 1930. It was the main industrial basis of the country during the Second World War.

Ural Mountains (anc't Hyperborean Mountains or Rhipaei Montes) form part of the boundary between Europe and Asia and separate the Russian plain from the W. Siberian lowland. The chain extends for 1500 m. from the Arctic Ocean to the deserts of Central Asia. The mountains are old and much eroded, particularly the central U. The highest peak is Mt Narodnaya in the N., 6210 ft. The U. M. are extremely rich in mineral resources: iron ores, copper, aluminium, asbestos, gold, platinum, nickel, chrome, etc. Large salt, coal, and oil deposits are found in the adjacent lowland. See also URALS.

Uralite: 1. Pyroxene (augite) (q.v.) which has been altered to an amphibole (hornblende) (q.v.).

2. A fireproof building material composed of chalk, silicate, bicarbonate of soda, and asbestos fibre.

Urals, The (Russian Ural), one of the main industrial areas of Russia, comprising the Central and S. parts of the Ural Mts (q.v.) and the adjacent lowland to the W. and E. It has extensive forests. There are rich deposits of iron ore, non-ferrous, precious, and rare metals, salts, precious stones, coal, oil, and building materials; these form the basis of large-scale mining, metallurgical, engineering, and chemical industries. The chief cities (with over 200,000 inhab.) are Sverdlovsk, Chelyabinsk, Molotov, Ufa, Nizhnyi Tagil, Magnitogorsk, Izhevsk, and Ozenburg. The Russian advance into the U. started in the 11th cent. from Novgorod (q.v.), rapid colonisation took place after 1479, and industrial development (iron mining and working) dates from the early 18th cent. Around 1800 the U. was the biggest producer of pig-iron in the world, and it held the first place in Russia till 1895, when it was outstripped by the S. Industrial Region (q.v.) of European Russia. New impetus was given to industrial development by the Five Year Plans (q.v.) and the Second World War, when the U. was the main industrial base of the country's war effort. Further industrial development in the U. is hindered by limited power resources, and it is therefore scheduled for priority building of atomic power stations. Total area 290,000 sq. m.; pop. (1955) 15,400,000, mostly Russians (over 80 per cent), also Bashkirs, Tatars, Udmurts. See also BASHKIR AUTONOMOUS REPUBLIC; CHELYABINSK; CHEKALOV; MOLOTOV; SVERDLOVSK; UDMURT AUTONOMOUS REPUBLIC.

Uralsk, tn in the W.-Kazakhstan oblast of the Kazakh S.S.R. It is situated on the Ural R. and is a meat-packing and wool-processing centre. Pop. 80,000.

Urania, Gk goddess of astronomy, *see* MUSES.

Uraninite, *see* PITCHBLEND.

Uranium, a metallic chemical element, symbol U, atomic weight 238.1, atomic number 92. It is a dense white metal, sp. gr. 18.7, which is used as a source of atomic energy. U. is radioactive, spontaneously disintegrating into radium, etc., and finally into lead, the complete disintegration taking an extremely long time. Its compounds are widely distributed in nature and are easily detected because of their radioactivity. It was in 1789 that Klaproth, from his investigation of the mineral pitchblende, concluded that the mineral must contain a new element which he called U. in honour of the new planet Uranus, which had been discovered in 1781. Klaproth did not succeed in isolating the metal, only its oxide. Peligot in 1840 was the first to prepare metallic U. successfully by the reduction of U. tetrachloride with potassium in a closed platinum crucible.

Two rich deposits of U. in the ore pitchblende are those at Great Bear Lake in Canada and at Katanga in the Belgian Congo. Deposits of the ore carnotite are found in Czechoslovakia and in Colorado, Utah, and Arizona in the U.S.A. The goldfields of S. Africa also produce U. Pitchblende and carnotite are the only 2 U. ores that have been processed extensively. Generally, (1) the ores are treated with a mineral acid to bring the U. into solution; (2) the U. is converted to a soluble complex carbonate, thereby removing iron, aluminium, and manganese; (3) lead and copper are precipitated as sulphides; (4) U. is recovered as sodium uranate or ammonium uranate, which is heated to give the oxide. The metal may be prepared from the oxide by the following methods: (1) reduction of U. oxides by carbon; (2) reduction of the oxides with aluminium, calcium, or magnesium; (3) reduction of U. halides with alkali metals or alkaline-earth metals; (4) fused-salt electrolysis of U. halides; (5) thermal decomposition of U. halides.

Uranium as a Source of Atomic Energy. The energy changes involved in a modification of the central nucleus of an atom of a fissile material like U. are about a million times greater than those involved in chemical reactions such as the burning of coal. Nuclear fission is the name given to the reaction in which a free neutron, the uncharged constituent of the nucleus, strikes the nucleus of a fissile element and causes it to split into fragments of dissimilar mass. Natural U. consists of a mixture of 3 isotopes, i.e. atoms of slightly different weights, in the following proportions: U^{238} 99.28 per cent, U^{235} 0.71 per cent, and U^{234} 0.005 per cent; of these atoms only U^{235} undergoes fission on the capture of a 'thermal' or slow neutron. Natural U. is used in the 'thermal' type of nuclear reactor, where

fission of the U^{235} converts the non-fissile U^{238} , by the absorption of neutrons to U^{239} , which rapidly decays to plutonium²³⁹. The fast or 'breeder' type of nuclear reactor requires a fuel containing an appreciably higher concentration of a fissile element than occurs in natural U. The fast neutrons liberated, however, are much more efficient in converting U^{238} to plutonium than are the slow neutrons in a thermal reactor. The plutonium produced in both types of reactor can be used as a fuel in the fast reactor.

Uranus, husband of Gaea (Earth) and the father of Cronus (Saturn) and other Titans, Cyclopes, and Hecatoncheires (hundred-handed). He represents heaven and the sky with its generative sun and rain. He was dethroned and mutilated by Cronus, and from his blood were formed the Gigantes on earth and Aphrodite in the sea.

Uranus, the first planet to be discovered since the invention of the telescope, was found by Sir Wm Herschel on 13 Mar. 1781, and named by him *Georgium Sidus* in honour of King George III. Its distance from the sun is over 19 times that of the earth. Its diameter is 3.9 times that of the earth, and its mass 14.6 times the earth's mass or only one-eighteenth that of Jupiter. In density it is about the same as the latter planet, i.e. one-third more dense than water. Up till 1949 only 4 satellites (Ariel, Umbriel, Titania, and Oberon) were known, but a fifth—Miranda—was discovered during that year by Kuiper, at the McDonald Observatory, U.S.A. All the satellites revolve around Uranus in a plane which is nearly at right angles to the plane of the planet's orbit.

Uradhas, *see* ARARAT.

Urari, *see* CURARE.

Urtatu, antc state in the Middle E., existing 9th-6th cents. BC on the Armenian plateau between the upper Euphrates in the W. and the lakes Urmia in the SE. and Sevan in the NE. Its cap. was Tushpa near Lake Van. In the early 8th cent. U. achieved a dominant position among the states of the Middle E., but later it suffered sev. defeats from the Assyrians and was finally destroyed by the Medes. U. culture was greatly influenced by Assyrian, and in turn influenced the Armenian and Georgian cultures.

Urban, name of 8 popes, 5 of whom deserve particular mention: *Blessed Urban II* (Eudes de Lagary). Cardinal Bishop of Ostia in 1078, he succeeded Victor III in 1088 and *d.* in 1099. The outstanding event of his pontificate was the Council of Clermont (1095), at which U. initiated the first crusade. *Urban IV* (Jacques Pantaléon), pope from 1261 to 1264. Appointed Patriarch of Jerusalem in 1255, he was on a visit to Rome when he was chosen to succeed Alexander IV. In the year of his death he extended the feast of Corpus Christi (q.v.) to the universal Church; but his pontificate witnessed the beginning of French influence in the curia, which led in the following century to the papal residence at

Avignon. *Blessed Urban V* (Guillaume Grimoard, or Grimaud de Beauvoir) succeeded Innocent VI, 1362, and *d.* 1370. A zealous reformer, he also founded the great medical school at Montpellier. U. was beatified by Pius IX in 1870. *Urban VI* (Bartolommeo Prignano), successor of Gregory XI, was pope from 1378 to 1389. It was his determination to reform the higher clergy that caused the election of the antipope 'Clement VII' and precipitated the Great Schism of the West. *Urban VIII* (Maffeo Barberini), pope 1623-44, successor of Gregory XV. Last of the popes to practise nepotism on a wide scale, he greatly increased the wealth of his family. In the political field U. did much to strengthen Rome and the papal states. Regarding the Thirty Years War as a mere secular conflict, he took the side of France. In 1633, because of a personal grudge, he allowed the condemnation of Galileo. To his credit, however, stand the revised Breviary (1631), the condemnation of Jansen (1644), and the erection of some noble structures in the Eternal City. These last include the College of Propaganda, the Palazzo Barberini, the Fountain of the Tritons, and the baldachino in St. Peter's. *See* POPES, LIST OF THE.

Urban District Council, *see* LOCAL GOVERNMENT.

Urbana, city, co. seat of Champaign co., Illinois, U.S.A., 125 m. SSW. of Chicago, in an agric. area. U.'s manufs. include scientific instruments. With adjoining Champaign, U. is the prin. seat of the Univ. of Illinois. Pop. 22,800.

Urbino (Lat. *Urbium Hortense*), It. tn in the Marches (q.v.), built on a hill 19 m. SW. of Pesaro (q.v.). It has a fine 15th-cent. ducal palace of the Montefeltro family, once lords of U., an archiepiscopal cathedral, and a univ. (non-State) founded in 1506. It was once known for its majolica ware. There is a lace and embroidery industry, and a trade in agric. produce and oil. Raphael and Bramante (qq.v.) were b. here. Pop. (tn) 6400; (com.) 22,800.

Urbium Hortense, *see* URBINO.

Urdingen, *see* KREFELD.

Urdu (from the Turkish *urdu*, 'camp,' meaning the 'Camp language') is the official language of Pakistan (q.v.). In fact, it is the Hindi language with intrusion of a great number of Persian (also Arabic and Turkish) words; *see* HINDÜSTĀNĪ LANGUAGE AND LITERATURE.

Ure, riv. of the N. and W. Ridings, Yorks, England, which rises 6 m. NW. of Hawes, near the borders of Westmorland. It is about 50 m. long and joins the Swale, forming the Ouse.

Urea, or **Carbamide** CONH_2 , compound which occurs in the urine of mammals and of carnivorous birds and reptiles. It forms about 3 per cent. of human urine. It may be prepared from urine by evaporation to small bulk and adding strong nitric acid. The precipitated crude U. nitrate is recrystallised from nitric acid and dissolved in water. The solution is then decomposed with barium carbonate, evaporated to dryness, and the urea

extracted with alcohol. In the laboratory U. is more commonly prepared by heating ammonium cyanate. It forms colourless crystals (melting point 132°C.) soluble in water and alcohol, and combines with acids to form salts. It is decomposed on heating, and heated with sodium hypobromite gives off nitrogen. This latter property is used as a method of estimation. U. was discovered in urine in 1773, and was artificially produced by Wöhler in 1828, the discovery being of fundamental importance as the first indubitable example of isomerism (q.v.). This production of urea (an organic compound) from ammonium cyanate (an inorganic compound) led to the abandonment of the 18th-cent. 'vital force' theory, which propounded the existence of a fundamental difference between inorganic and organic compounds. U. is nowadays manufactured on a fairly large scale from calcium cyanamide, for use as an artificial manure; it is also used in the manufacture of a clear synthetic resin, and in the preparation of various drugs, e.g. veronal (q.v.). *See also* PLASTICS. *See* E. A. Werner, *The Chemistry of Urea*, 1923; P. Karrer, *Organic Chemistry*, 1947. **Urea-formaldehyde,** *see* PLASTICS.

Urethane, *see* HYPONOTICS.

Urey, Harold Clayton (1893-), Amer. scientist, b. Walkerton, Indiana, educ. at Montana Univ. and the univ. of California (Ph.D.). He was associate prof. of chemistry Columbia Univ. (1929-34), prof. (1934-45), executive officer, dept. of chemistry (1939-42), director of War Research Atomic Bomb Project (1940-5), prof. of chemistry, univ. of Chicago, since 1945. In 1934 he was awarded the Nobel prize for chemistry for his discovery of heavy hydrogen; he is also known for his work on the separation of isotopes, the structure of atoms and molecules, and the thermo-dynamic properties of gases.

Urfa, tn of S. Turkey, cap. of il of the same name. The anc. Edessa, it was cap. of an independent kingdom in 137 BC, and was held by the Crusaders in 11th and 12th cents. AD. The modern tn is a centre of the wheat industry. Pop. (tn) 37,000; (il) 347,712.

Urqa, since 1924 **Ulan Bator**, cap. of the People's Rep. of Outer Mongolia, on the R. Tola, 170 m. S. of Kiachta. It was once the residence of the Hutukta Lama, the head of the Mongolian Buddhists. Since Outer Mongolia became independent of China in 1945, the international importance of U. has greatly increased, especially since a new railway between Chining (China) and Kiachta was built in 1955. Pop. 190,000.

Uri, one of the forest cantons of Switzerland, belonging to the 3 original cantons of the Confederation, founded in 1291. It is bounded by the Lake of Luzern and the cantons of Schwyz, Glarus, Grisons, Ticino, Valais, Bern, and Unterwalden. The prin. river is the Reuss, whilst the St. Gotthard Railway crosses the canton. Cattle-rearing is carried on, also cheese-making and bee-keeping, but more than half the surface is barren rock or glaciers. The chief tn is Altdorf (q.v.). Area

415 sq. m.: pop. (1955) 29,600, most of whom are Ger.-speaking Rom. Catholics.

Urial, Oorial, or *Ovis vignei*, known also as the Punjab wild sheep, a species of the genus *Ovis*, found chiefly in the Punjab, Afghanistan, and Persia.

Uriburu, see ZARATE.

Uric Acid ($C_4H_3N_3O_6$), product of the metabolism of the animal organism, and occurs in small quantities in human urine. It sometimes accumulates in the bladder, forming 'stones,' or is deposited in the tissues of the body (see under GOUT). The excrements of birds (guano) and of reptiles contain large quantities of the acid. Serpents' excrements consist chiefly of ammonium urate, and the U. A. is prepared by boiling with caustic soda, and the clear alkaline solution precipitated with hydrochloric acid. The acid forms crystals which are insoluble in water. Evaporated with nitric acid, a yellow stain is left, which becomes intensely violet on addition of ammonia.

U. A. is a weak dibasic acid, and forms salts which are all sparingly soluble in water.

Urinary Calculus, see CALCULUS, in medicine.

Urine, fluid excreted by the kidneys. It contains a large proportion of water as well as some of the waste products of metabolism. The kidneys (q.v.) extract these waste products from the blood and pour their secretions into the ureter, by which the fluid reaches the bladder, there to be retained for a while until it is discharged to the exterior by the urethra. U. as excreted is normally clear and of straw colour, which may be pale or dark merely from variations in concentration. It is usually acid in reaction, but after a meal there may be an alkaline tide, and the U. after standing will deposit a cloud of phosphates. The sp. gr. of U. varies from 1015 to 1020. In glycosuria (q.v.) the sp. gr. may be as high as 1030.

The most important of the nitrogenous products in the U. is urea $CO(NH_2)_2$ (q.v.), which contains about 90 per cent of the total nitrogen excreted. Urea is formed from the amino-acids resulting from the digestion of proteins. About 4 per cent of the nitrogen in U. is contained in ammonia, which can often be detected by its odour. Other nitrogenous substances present in U. are uric acid, hippuric acid, and creatinin. Concentrated U. may show a deposit of urates, usually coloured pink. It is of no pathological significance. The amount of U. discharged by an adult man is about 2½ pints daily on the average. See also UROLOGY.

Urvonium, see WROXETER.

Urk, former is. in the IJsselmeer (Zuider Zee), Netherlands, now part of the NE. Polder (q.v.).

Urmia, see REZA'YEH.

Urmston, urb. dist. of Lancs, England, 6 m. from Manchester. It embraces part of the comprehensive industrial estate known as Trafford Park. Pop. 40,000.

Urn Burial, see BURIAL CUSTOMS.

Urnes, see VIKING ART.

Urodela, or Caudata, name applied to an order of Amphibia which has for its distinguishing characteristics a well-developed tail which persists throughout life and usually 2 pairs of limbs. There are about 100 species, and nearly all occur over the temperate N. hemisphere. Newts, salamanders, and mud-eels are representative of the order.

Urology, study of the diseases of the urinary tract. The chief parts of the urinary system are the kidneys (q.v.), ureters, bladder (q.v.), and urethra. In addition to abnormalities, displacements, and injuries, kidneys may be affected by tuberculosis (q.v.), pyelonephritis, tumours (q.v.), hydronephrosis, calculus (q.v.), and other diseases. The chief abnormalities of the ureters, the ducts conveying the urine from the kidney to the bladder, are dilations and constrictions, abnormal bends and twists; the origin of the ureter from a position too high to drain the kidney; blind endings and the opening of the ureters into parts of the genito-urinary system other than the bladder. Urethritis is frequently associated with infection of the kidney. Not infrequently the passage of the ureter is partially or completely blocked by calculi. Diseases of the bladder are, mainly, cystitis, or inflammation of the bladder, calculus, or stone, in the bladder, and benign and malignant growths (see under BLADDER). Diseases of the prostate gland (q.v.) are in the field of U., and the treatment of adenomatous enlargement of the gland and malignant growths in it form a large part of the work of the urologist. The urethra is subject to inflammation (urethritis), one of the commonest causes of which is gonorrhoea (q.v.). Surgical treatment in urological diseases has made great advances in recent years, and it is now possible to remove the bladder entirely in malignant disease. The antibiotics have greatly simplified the treatment of the urinary tract.

Urotropine, see HEXAMINE.

Urquhart, Sir Thomas (1611-60), Brit. author and translator. He studied at King's College, Aberdeen, his education being completed with the usual continental tour. During the Civil war he was a royalist. In 1653 was pub. the first part of the work that has made his name famous, the trans. of Rabelais, one of the most perfect trans. ever made. It was reprinted in the Everyman's Library, 1929. See J. Willcock, *Sir Thomas Urquhart, Knight, 1611-1660*; H. Brown, *Rabelais in English Literature*, 1933.

Ursa Major (the Great Bear), one of the best known of all the constellations, can be easily found, as it is never completely below the horizon in the Brit. Is., though some portions of it cannot be seen at certain times in the most N. parts of Scotland. No one can mistake the 7 stars in this constellation; these are known as the Plough, the Wagon, Charles's Wain, and also as the Dipper in America. It should be noticed that U. M. contains not only these 7 stars but also scores of others, and it is necessary to avoid a common error of identifying 'the Plough,' etc.,

with the whole constellation. The first 2 stars of the Plough, known also as α and β Ursae Majoris, are called 'the Pointers' because an imaginary line drawn through them points to the pole star—the nearest bright star to the celestial pole (it is now less than 1° from it). By prolonging the line through the 2 stars at the other end of the Plough, known as ζ and η Ursae Majoris, it will pass fairly close to the bright star Arcturus in the constellation of Boötes. ζ Ursae Majoris, also known as Mizar, has a faint companion near it which can be detected with the naked eye (see MIZAR). It is remarkable that all the stars in the Plough, with the exception of the first and last, that is α and η , are moving in the same direction, and different stars scattered throughout the sky, such as Sirius, β Aurigae, and others, share in this motion.

Ursa Minor (the Little Bear), small constellation chiefly remarkable for the fact that Polaris (the Pole Star) is situated at the end of its tail (see POLARIS).

Urmars, St (d. 713), abbot-bishop of the Benedictine abbey of Lobbes, on the Sambre. He founded Wallers and Aulne, and did important work as regionary Bishop in Flanders.

Ursula, St, of Cologne, is said by the ancient legend to have been put to death at this place some time in the 4th cent. together with 11,000 virgins, her companions. Even in the Middle Ages this popular story was viewed by many with suspicion, and it now universally recognised that the greater part of it is legendary. Her feast is on 21 Oct.

Ursulines, an order of women in the Rom. Catholic Church, founded at Brescia, Italy, in 1535 by St Angela Merici for the education of girls. St Ursula was chosen as a special patroness, and hence the nuns came to be called Ursulines. The members lived at first in their own homes; later they lived in a community, and finally the communities were approved as a religious order by Pope Paul V in 1612. This order of St Ursula, as it was called, was the first specifically teaching order of women. The order spread rapidly throughout every country in Europe and N. and S. America, and later in the other 3 continents. More than 7000 U. are united under a Mother General living in Rome, forming the Rom. union of the order of St Ursula. In England they have a House of Studies for their student nuns at Wimbledon, and 6 convent schools, at Westgate, Forest Gate, Wimbledon, Greenwich, Chester, and Ilford. There are many autonomous communities of U., while some have joined to form smaller congregations such as Thildonck and Calvarienberg.

Urticaceae, family of dicotyledonous herbs, shrubs, or trees of 500 species, mostly tropical; usually with stipulate leaves, monoecious or dioecious flowers in axillary cymes, 4 or 5 stamens with filaments uncurling suddenly when pollen is ripe; 1-celled ovary and achene or drupe fruits. Chief genera are *Boehmeria*, *Heliconia*, *Humulus*, *Laportea*, *Myriocarpa*, *Pilea*, *Urera*, *Urtica*.

Urticaria, or Nettle-rash, skin reaction due to various causes. U. is characterised by raised red or white weals similar to those produced by the sting of a nettle, and accompanied by a sensation of burning and irritation, the latter sometimes being intense. U. is a symptom and not a disease. The most usual cause is allergic (see ALLERGY), but it may be toxic, psychological, or endocrine in origin, or arise from a combination of these factors. Among the allergic causes are: (1) inhaled substances, such as pollens, feathers, animal hairs, house dusts, and insecticides; (2) ingested substances, such as foods (egg, milk, chocolate, fruits, fish, and shell-fish) or various drugs, such as aspirin, quinine, penicillin, and the sulphonamides; (3) injected substances, such as serum in serum therapy or blood transfusion, insect bites and stings, and various drugs, such as penicillin, liver extracts, or endocrine substances; (4) allergens produced from bacterial foci of infection in the body, such as septic teeth, tonsils, or sinuses; (5) contact substances, such as various plants (primula, tomatoes, chrysanthemums), touching animals or the products of animals used in clothing, etc., cosmetics, and the dye in clothes; and (6) physical agents, such as light, heat, and cold. U. sometimes follows an emotional upset, such as anger or fright or more sustained states of emotional tension. It may also occur with fatigue. It is apt to occur at puberty or the menopause, when a combination of psychological and endocrine factors operates. U. is not contagious.

Uruguay, known as the República Oriental del Uruguay, smallest rep. in S. America, situated between Brazil and Argentina, on the Atlantic coast. Its area is 72,153 sq. m. and its estimated (1953) pop. is 2,500,000 of which some 770,000 live in Montevideo.

Physical Features. There is a S. fringe of alluvial land bordering the lower U. riv. and the Río de la Plata N. of Colonia, but most of the country is hilly with soils derived from crystalline rocks, while some of the more prominent ridges are crowned with huge granite blocks. On the E. coast there is a zone of lowland, composed of sandy beaches, dunes, and lagoons. Inland from this is a belt of hills extending from S. Brazil southward to the S. coast of U. near Montevideo and extending along the divide between the shorter streams flowing directly to the Atlantic and the longer streams flowing westward to the U. river. The summits along the Cuchilla Grande, as the divide is called, reach a height of 2000 ft. Westward from the divide the land slopes gently to the U. riv.; along the divide the valleys are narrow and the streams turbulent, but, lower down, they broaden out, developing small flood plains. The chief rivs. are the U. and the Negro. Vegetation and climate are transitional between the Argentine humid pampa and S. Brazil. Most of U. was once covered with tall-grass prairie; the stream valleys, however, were, and still are, followed by

ribbons of dense forest. In the SE. the grasslands are mixed with scattered palms. Climate is temperate.

Production. The major commercial products in order of value are wool, beef, canned meats, hides and skins, linseed, wheat, sand, and stone. Meat-packing plants have been estab., e.g. the Liebig plant at Fray Bentos. Wool, too, became an important export, and is now the largest single item of commerce. High-grade wool and mutton sheep were introduced in 1840. To-day herds of high-grade merino sheep are a characteristic feature of Uruguayan rural life. Immediately before the Second World War

the great cities of S. America), Paysandú, Salto, Mercedes, Minas, Tacuarembó, Rocha, Melo, Treinta y Tres, Artigas, Rivera, and Fray Bentos.

Administration. The first constitution of U. was that of 18 July 1830, adopted 2 years after the achievement of Uruguayan independence of Brazil. The next constitution, that of 1919, was abolished in 1934, the present constitution being approved by a Constituent Assembly on 18 May of that year. Under the Constitution of 1934, as subsequently modified by the law of 29 May 1942, the president of the rep. is elected by the legislature for a term of 4 years and is



MONTEVIDEO: THE PLAZA INDEPENDENCIA

E.N.A.

U. was credited with nearly 40 per cent of all Lat. Amer. wool exports. While pastoral life and products dominate the economic system of U., there is nonetheless an important agric. zone. There are about 100,000 farms averaging 250 ac. each. In this small well-defined zone wheat covers over half of the land devoted to crops, and half is grown for domestic consumption; flax, linseed, and rice are regularly exported, and oats and maize are grown. Skins of various fur-bearing animals, notably nutria and seal-skin, are collected for mrkt and exported. Whaling is carried on from Montevideo, the winter anchorage of some Brit. and Scandinavian whaling flotillas. Lead, copper, and manganese, and a little gold and silver are mined; also lignite coal and some iron.

Population. U. is divided into 19 depts. The pop. is almost entirely white. The chief cities and tns are: Montevideo City (cap. of the State and one of

eligible for re-election after 4 years have elapsed since the date when his mandate ended. The executive power is vested in the president, assisted by a council of 9 ministers. The legislature consists of a chamber of 99 deputies and of a senate of 30 members, elected under proportional representation for 4 years. All adult literate citizens male and female have the vote. Parl. and municipal elections are held simultaneously every 4 years. An absolute majority in both houses of Parliament is necessary before fresh taxation can be levied. Revenue bills cannot be originated by Parliament and must be introduced by the gov. U. is one of the most advanced of all the Lat.-American States in the provision of state-controlled social services. There is a supreme court of 5 judges elected by Congress (i.e. the 2 chambers sitting as a national assembly), with the original jurisdiction in constitutional and admiralty cases, and an appellate jurisdiction in cases from the 3

courts of appeal, each of which latter has 3 judges appointed by the supreme court. In Montevideo there are also 3 courts for ordinary civil cases, 7 for commercial cases, and a number of criminal and correctional courts. Each departmental cap. also has a departmental court, and each of the judicial sections into which the rep. is divided has a justice of the peace; and there are also a large number of *alcaldes* or deputy-judges for the trial of dist. cases involving small pecuniary issues.

Religion and Education. The majority of the pop. is Rom. Catholic, but no religion is estab. by the State, and there is complete religious liberty in U. Primary education has been free and compulsory since 1877, and the proportion of illiterates is lower than in most Lat.-American countries. There are 2072 State schools with 299,000 enrolled pupils and about 6700 teachers. The univ. of Uruguay at Montevideo, was inaugurated in 1849.

Defence. The Army consists of the active force recruited on a voluntary basis and its reserves. There are 9 regiments of cavalry, 5 each of artillery and infantry, 1 tank regiment, and 6 pioneer regiments. There is a small naval force, in addition to a small air force.

Finance. Revenue for 1955 was \$454m. and expenditure was stated to be \$509m. The theoretical gold coin monetary unit is the *peso oro*. In July 1950 the rate to the £ sterling was 6.65 and in July 1955, \$11.8 (free market). \$7.84 was the official rate for most goods. In 1955 the country's total imports were valued at U.S. \$218,400,000, and exports at U.S. \$171,900,000.

Communications. The national roads have a total length of 4860 m. and there are also about 21,000 m. of unpaved roads. The roads of U. are amongst the best in S. America. Railways in U. are now all State-owned. The 4 Brit. companies were sold to U. in 1948, and continue under State ownership as a separate administration called the Central Uruguayan Railway. The total railway system open for traffic is 1928 m. of standard gauge. There are 775 m. of navigable riverways. Carrasco is the chief airport.

History. During the colonial period U. was remote from the centres of both Portuguese and Sp. settlements. Yet by 1680 the Portuguese had advanced southward to the Plata shore and built a fortress at Colonia opposite Buenos Aires. Remoteness from the Sp. settlements on the humid pampa was due to the riv. barrier, the Paraná-Plata, wide and bordered by a labyrinth of swamps and shifting channels, making travel impracticable. The E. shore (called the Banda Oriental) of the Plata was occupied by nomadic herdsmen or gauchos. Cattle were introduced about 1603 and allowed to run wild and multiply. The institution of land ownership as distinct from ranch H.Q. came only gradually, but eventually the landowners replaced the gauchos with hired workers and peons. As this type of

rural settlement spread northward small vile. and tns began to be built, generally at road junctions. U. became a country of small scattered ranches. Montevideo was founded by the Sp. governor of Buenos Aires in 1726, and eventually became chief urb. centre of the Banda Oriental. National independence came to U. as a result of influences beyond its borders. When Brazil declared its independence in 1822 U. was included as part of Brazilian national ter. In 1825 an Argentine army invaded the Banda Oriental, drove the Brazilians northward, and gained control of the whole of what is now U. When it looked as if Argentina might be in a position to control both banks of the Plata, the British intervened, and in the subsequent peace negotiations (1828) they secured the agreement of both Argentina and Brazil to the estab. of an independent U. as a buffer state. It is now one of the most prosperous states in S. America. Leading industries, banks, public utilities, etc., have been nationalised. U. declared war on Germany and Japan on 22 Feb. 1945, and later became a foundation member of the U.N. See R. J. Enoch, *Republics of South America*, 1913; M. J. G. Ross, *Argentina and Uruguay*, 1917; W. Parker, *Uruguayans of To-day*, 1921; J. Supervielle, *Uruguay*, 1928; E. Acevedo, *Anales Históricos del Uruguay*, 1933; S. G. Hanson, *Utopia in Uruguay*, 1938; P. E. James, *Latin America*, 1942; J. Salgado, *Historia de la República Oriental del Uruguay*, 1943; G. Pendle, *Uruguay, S. America's first welfare state*, 1945; R. H. Fitzgibbon, *Uruguay, Portrait of a Democracy*, 1954.

Uruguay, riv. of S. America, forming, with the Paraná, the R. Plate (q.v.). For the lowest 400 m. of its course of 1000 m. it forms the Argentine-Uruguayan frontier. The Rio Negro is its chief affluent.

Urumchi, or **Tihwa**, cap. of Sinkiang Uighur Autonomous Region of China, on the E. bank of R. U. in the Iazungarian Basin, N. of T'ien-shan. By the 1881 Sino-Russian treaty it was opened as a trading port. 'Tihwa' was a derogatory name given to it by the Manchus, and it was so called until 1951. It is on the old Silk Route and has good road communications with other cities in Sinkiang and Kansu. The Lanchow-Sinkiang railway, which is eventually to join the Russian Siberian railway, passes U. It is the centre of many air lines in Sinkiang and the refuelling station of liners between Peking and Moscow. The Shakang coal mine is to the W. of the city. Its chief exports are wool, cotton, and fur. Agriculture is well developed. Three newly founded colleges are situated in the city. Pop. approximately 150,000.

Urumia, see REZA'YEH.

Urundi, see RUANDA-URUNDI.

Urville, Jules Dumont d', see DUMONT.

Uryankhay, obsolete name of TUVA (q.v.).

U.S.A. Standards, see METROLOGY.

Usages, see CUSTOMS.

Usambara, dist. of Tanganyika near the Kenya border and also the name of a mt range in the Tanga prov.

Usambara Violet, see **AFRICAN VIOLET**.

Usbege, see **UZBEKS**.

Usedom (Polish **Uznam**), is. lying between the Stettiner Haff and the Baltic Sea, now divided between the Polish prov. of Szczecin and the E. Ger. dist. of Rostock (qq.v.). Until 1945 it belonged to Prussia. The chief tn is Swinoujście (q.v.). Area 170 sq. m.; pop. about 50,000.

Usertsen, see **SESOSTRIS**.

Uses, in law, the benefit or profit of lands considered as detached from and opposed to the legal ownership, or *seisin* (q.v.). Use implies a trust or confidence reposed in someone for the holding of lands, and all modern conveyances are directly or indirectly founded on the doctrine of U. and trusts, which doctrine has rightly been regarded as the most technical and intricate part of the real property law of England.

The doctrine of U. was a purely equitable one, and was employed by eccles. corporations to evade the statute of mortmain (see **CHARITABLE TRUSTS**; and **MORTMAIN**), and by landowners to evade feudal burdens, or to make land devisable by will at a time when that was impossible by common law (q.v.). The effect of the statute of U., 1535, the object of which was, by *executing* the use or turning it into the full legal estate, to circumvent the above devices, was not what the legislature had hoped; because the courts soon held that only the first and not subsequent *uses* was executed; hence if A left land 'to B to the use of C to the use of D,' C had the legal but D the beneficial ownership. These judicial decisions defeated the main policy of the statute, and restored U. under the now more familiar name of trusts (q.v.), and hence brought about the whole modern system of 'equitable estates.' If land be conveyed to A to the use of B, B has the possession vested in him; but if the conveyance be to A, to the use of B *in trust* to permit C to enjoy the profits, B has the *legal*, but C the *equitable*, estate (q.v.). U. apply only to lands of inheritance, and therefore are inapplicable to leaseholds. On the equitable doctrine of the 'separate use' by which property given to a woman was free from her husband's control, see **HUSBAND AND WIFE**; **RESTRAINT UPON ANTICIPATION**; **SCOTS LAW**.

Ushant (Fr. **Ouessant**), is. in the dept of Finistère, France, 27 m. NW. of Brest. It has steep coasts, with a fertile soil; fishing is the chief industry, and the small port of Ouessant on the SW. is the only tn. There are 2 lighthouses and a telegraph and a life-boat station. There were 2 battles fought off Cape U. in the 18th cent. The first was between the French under D'Orvilliers and the English under Keppel in 1778 and was indecisive. The second was fought on the 'Glorious First of June,' 1794, when Adm. Lord Howe gained a great victory over the French under Villaret-Joyeuse, capturing 7 vessels. (See **NAVY AND NAVIES**). Pop. 2200.

Ushas, Hindu goddess of the dawn, to whom Vedic hymns are addressed.

Ushaw College, 4 m. W. of Durham, England, a Rom. Catholic eccles. college, dedicated to St Cuthbert, opened in 1808 to continue the work of the Eng. College at Douai.

Ushba, see **CAUCASUS**.

Ushuala, see **TIERRA DEL FUEGO**.

Usk, par. and mrkt tn of Monmouthshire, England, 6½ m. E. of Pontypool and 12 m. SW. of Monmouth, on the site of a Rom. settlement. There are remains of a 12th-cent. castle, and the church was originally attached to a 13th-cent. Benedictine nunnery. Nylon is manufactured, and there is salmon fishing and trade in agric. produce. Pop. 1600.

Usk (Welsh *Wysg*), riv. of Wales, rising in the Black Mt on the boundary between Breconshire and Carmarthenshire. It flows through Breconshire and Monmouthshire and enters the Bristol Channel at Newport. Length 57 m. The U. valley is famous for its scenery, and its upper reaches are included in the Brecon Beacons National Park. Caerleon (q.v.) stands on the riv. near Newport.

Usküb, see **SKOPJE**.

Usküdär, see **SCUTARI**.

Uspallata Pass, also known as *La Cumbre or Bermejo*, pass across the Andes to the S. of Mt Aconcagua. It is over 12,600 ft high, and the tunnel through which the railway runs is about 2 m. long (altitude c. 10,470 ft). Puerto del Inca (Argentina) and Portillo (Chile) are at the E. and W. entrances to the pass. Hero stands the famous Christ of the Andes, commemorating the peace settlement between Argentina and Chile (1904).

Usquemonds, see **ESKIMO**.

Ussel, Fr. tn, cap. of an arron., in the dept of Corrèze. It has foundries, and hardware manufs. Pop. 7000.

Ussuri, riv. of E. Asia, joining the Amur at Khabarovsk. From Lake Khanka it flows NNE., and for most of its 500 m. divides Manchuria from Russia. The railway to Vladivostok runs along its valley, and the riv. is navigable. See A. Schultz, *Das Ussurieland*, 1932.

Uster, industrial tn in the canton of Zürich, Switzerland, NE. of the Greifen-See. At U. a mass demonstration in 1830 demanding a radical democratic reform to abolish inequality between tn and country and among the working people led to the introduction of more liberal legislation, implying larger popular sovereignty, and to the protection of women and children against industrial exploitation. Pop. (1955) 13,600.

Usti Nad Labem: 1. Region (*kraj*) in NW. Czechoslovakia, bordering on Germany, part of the former prov. of Bohemia (q.v.). It contains the N. half of the Erzgebirge (q.v.), and is watered by the Labe (see **ELBE**) and the Ohře (q.v.). Area 1598 sq. m.; pop. 623,000.

2. (Ger. **Aussig**), Czechoslovak tn, cap. of the region of U., at the confluence of the Labe and the Diela. It was the scene of a victory of the Hussites (q.v.) in 1426. It is a riv. port and a railway junction; chemicals, textiles, and machinery are manuf., and there is a trade in coal, timber, sugar-beet, and stone. Pop. 56,400.

Ust'-Kamenogorsk, in on the Irtysh R. in E.-Kazakhstan oblast (prov.) of the Kazakh S.S.R. of the Soviet Union. It has a zinc smelting plant and a large hydro-electric plant at Ablakotka 10 m. to S. Pop. 100,000.

Ust'-Ordynskiy, settlement, former vil., in the Irkutsk oblast of S. Siberia, 43 m. NE. of Irkutsk. It is cap. of U.-O. Buryat-Mongol National Dist. (formed 1937). Pop. (1956) 7000.

Ust'-Sysol'sk, see SYKTYVKAR.

Ustyug Velikiy, see VELIKIY USTYUG.

Usufruct, in Rom. law, the temporary use and enjoyment of lands or tenements, or the right of receiving the fruits and profits of lands or personal property belonging to another, without having the right to alienate or change the *corpus* or property itself.

Usury, formerly denoted any legal interest for the use of money, but in present usage denotes only illegal or excessive interest. Many early laws of the Church prohibited U. of any kind. See INTEREST and MONEYLENDER.

Utah, the 'Beehive State,' since 1896 a state of the U.S.A., and confined by Nevada (W.), Idaho and Wyoming (N.), Colorado (E.), and Arizona (S.). The Wasatch Mts (highest peak Timpanogos, 12,008 ft) shut off the W. section, which belongs to the Great Basin of the continent and consists of highlands running N. to S. separated by valleys of desert wastes from the E., which belongs to the Colorado basin, and is remarkable for its lofty plateau, through which big canyons carve their passage. Zion and Bruce Canyon National Parks are in this area, and in the former evidence of a prehistoric people has been found. The colouring and erosional formation of the canyons are unsurpassed. The Uinta Mts, though an offshoot of the longer range already mentioned, contain the greatest elevations in the state, the culminating summit being Kings Peak (13,498 ft). The climate is dry, rather cold in winter and warm in summer. A notable feature is the Great Salt Lake, 75 m. long, 50 m. wide, and 20-27 per cent salt. Every attempt is being made to reclaim by irrigation the vast tracts of unfruitful soil, and total farm land is over 10,000,000 ac., divided among 26,000 farms. Only 3 per cent of the land is arable, and most of this is under irrigation. The chief crops are those of wheat, oats, potatoes, rye, corn, barley, alfalfa (876,000 tons in 1946), and hay; the growth of nursery produce and fruits is also greatly encouraged. Between 1939 and 1947 the state's income from agriculture more than doubled. Cattle and sheep-raising are important. The wool-clip in U. in 1947 yielded over 13,500,000 lb. In 1947 there were approximately 1,646,000 sheep and 550,000 head of cattle. The wonderful development of U.'s agric. resources has almost overtaken the mining industry. Copper, and after that silver, zinc, coal, lead, uranium, vanadium, and gold (in which U. leads), are the most valuable minerals. Mineral production in 1950 was valued at \$229,956,000. Since the Second World

War U. has become an important producer of steel; the Geneva Steel Mills have an ann. capacity of 1,250,000 tons. The manuf. of flour and of railway cars, and also printing, are important, and there are copper and lead smelting works, beet-sugar factories, canning and preserving of fruit and vegetables, grain and flour-mill products, slaughtering and meat-packing, and the manuf. of butter, cheese, and confectionery.

Brigham Young and his 150 followers (see MORMONS) entered Salt Lake Valley in 1847. A year later U. was ceded to the U.S.A. by Mexico, and it was organised as a ter. in 1850. On 4 Jan. 1896 it was admitted as a state into the Union. It is ruled by a Senate and House of Representatives and sends 2 representatives and 2 senators to Congress. 1,774,486 ac. are given over to Indian tribes. School attendance is compulsory between 8 and 18 years of age. There are the agric. college at Logan, the Brigham Young Univ. at Provo, as well as many other colleges. The Latter-Day Saints comprise three-fourths of all church membership. Area 84,916 sq. m.; pop. 688,862, the chief cities being Salt Lake City, 182,121; Ogden, 57,112; Provo, 28,935.

Utakamund, or **Ootacamund**, municipality and tn in the dist. of Nilgiri Hills, Madras, India, 36 m. NNW. of Coimbatore. It is 7000 ft above the sea, and is the prin. sanatorium and summer resort of the state. Pop. 29,900.

Utamaro (1754-1806), Jap. artist of the Kiyo-yo school, b. Yedo, known chiefly by his colour wood-cuts. U. was the first Jap. artist to become well known in Europe, many of his prints being sent there during his lifetime by Dutch merchants resident at Nagasaki. See C. S. Ricketts, *Pages on Art*, 1913; and lives by E. de Goncourt, 1891; J. Kurth, 1907; Y. Noguchi, 1932.

Ute, N. Amer. Indian tribe of Shoshonean stock, with the Shoshone (q.v.) the most war-like of the Plateau Indians. Their effectiveness as warriors was early accentuated by their use of horses. To-day they number about 2200, in Utah, the state named after them.

Uterus, or **Womb**, generative organ in which the development of the fertilised ovum takes place. It is a pear-shaped organ, flattened and about 3 in. long in the non-pregnant condition. Its position is between the bladder and the rectum, with the base directed forwards and upwards; the cylindrical neck or *cervix* is directed towards the vagina, with which it communicates by the *os uteri externum*. This orifice is small and elliptical in the virgin, but after pregnancy remains much wider. The wide portion, or *fundus*, of the U. receives the Fallopian tubes at its 2 upper angles. The fundus is triangular in form, the apex being a constriction called the *os uteri internum* leading to the cervix. The walls of the U. consist of mucous membrane as its inner surface continuous with that of the vagina, a thick layer of muscular tissue, and an outer surface of peritoneum. The peritoneum is reflected outward to the wall of the pelvis and forms

a means of suspension for the organ. This arrangement not only provides for a great degree of mobility but also allows for considerable distension in pregnancy. During the period of sexual activity, from puberty to the menopause, the U. discharges about 6 oz. of blood and mucus at intervals of 28 or 30 days. The chief function of the U. is, however, the development of the fertilised ovum. The ova are carried from the ovary to the U. by way of the Fallopian tubes. After the ovum has been fertilised, it depends for the nourishment necessary for development on the U., which is furnished with structures adapted to that end and for carrying away the waste products of the foetus. The U. is the seat of many disorders, which are dealt with in that branch of medicine known as gynaecology (q.v.). Owing to its mobile situation, the organ is subject to many varieties of displacement. Inflammation of the mucous lining of the U. is called endometritis. It is due to the extension of infective inflammation from other structures, or to sepsis following the expulsion of the foetus. The U. is a very common seat of tumours, both benign and malignant. Benign tumours are known as fibroids. Surgical treatment at an early period of the disease often leads to the cure of cancer of the U. See also GYNAECOLOGY.

Uthwatt of Lathbury, Augustus, Lord (1879-1949), lawyer, b. in Australia and educ. at Ballarat College, Victoria, and Balliol College, Oxford. He was called to the Bar in 1904. In 1941 he became a judge of the Chancery Div. of the High Court and, soon after, was appointed chairman of the committee on compensation and betterment set up primarily to ascertain how best to prevent the work of reconstruction being prejudiced by land speculation. The outcome of this committee's work was the Uthwatt Report, which, with the Scott and Darlow Reports, provided a basis for post-war town and country planning (see TOWN AND COUNTRY PLANNING). In 1946 U. was elevated to the House of Lords as a Lord of Appeal in Ordinary.

Utica, anct city of N. Africa, situated 25 m. NW. of Carthage in the present dist. of Tunis. It was founded by the Phoenicians c. 1100 BC, and after the destruction of Carthage (146 BC) rose to be the first city of Africa, and cap. of the Rom. prov. U. was later immortalised as the scene of Cato's suicide (46 BC).

Utica, city and co. seat of Oneida co., New York, U.S.A., on the Mohawk. It is a railway and canal centre, and has manufs. of cotton goods, hosiery, engines, machinery, iron and brass castings, firearms, furniture, and paper and wood products. The large Welsh pop. holds annual festivals. Pop. 101,530.

Utilitarianism may be summarised by its own catch-phrase, 'the greatest happiness of the greatest number,' such happiness being the criterion of ethical right and wrong, and pleasure and freedom from pain the only desirable ends of life. See ETHICS. The term originated with Bentham as a purely philosophical and

political expression. His *Principles of Morals and Legislation*, 1789, must be regarded as the origin of the movement, which culminated in John Stuart Mill. Mill defined U. as 'the creed which accepts as the foundation of morals utility, or the greatest happiness principle, holds that actions are right in proportion as they tend to produce happiness, wrong as they tend to produce the reverse of happiness.' A new aspect of U., considered on biological or evolutionary grounds, was pointed out in Darwin's *Descent of Man*, and followed up by Herbert Spencer and Sir Leslie Stephen. The name of Henry Sidgwick (*The Methods of Ethics*, 1874) must also be mentioned in connection with purely philosophical U. See Sir L. Stephen, *English Utilitarians*, 1900; E. Albee, *History of English Utilitarianism*, 1902; J. S. Mill, *Utilitarianism*, 1863 (reprinted in Everyman's Library); J. Plamenatz, *The English Utilitarians*, 1949.

Utility, see FURNITURE.

Utopia, (nowhere; Gk *ou*, not and *topos*, place) name given by Sir Thomas More to the imaginary is. of his *De Optimo Reipublicae Statu, deque Nova Insula Utopia* (1516). From it the adjective Utopian has been formed to mean 'impracticable' or 'ideal.' The most famous utopias or ideal commonwealths are those described in Plato's *Republic*, St Augustine's *City of God*, Bacon's *New Atlantis*, Samuel Butler's *Erewhon*, and William Morris's *News from Nowhere*. A fanciful one is Cloudeuckootown in Aristophanes's *Birds*.

Utraquists, see HUSSITES, WAR OF THE.

Utrecht: 1. Smallest prov. of the Netherlands, lying S. of the IJsselmeer. The soil is sandy and sterile in the E., but more fertile in the W. Dairy products and livestock are important; fruit, vegetables, and cereals are grown. Industries are concentrated in and around the city of U. and Amersfoort. Area 527 sq. m.; pop. (1954) 618,077.

2. Cap. of the above prov., situated on the Old Rhine, 38 m. E. of The Hague. It is a centre of rail and road traffic, and the seat of a Rom. Catholic and of the Old Catholic archbishopric. Among the prin. buildings are the fine Gothic cathedral (damaged by a hurricane in 1674), the univ. (founded 1636), and an archiepiscopal museum. The chief manufs. are cloth, woollen goods, carpets, pottery, organs, chemical products, engineering goods, and gin. An international trade fair is held twice a year. U. is very ant., being known to the Romans as Trajectum ad Rhenum. The Treaty of U. (1713) was signed here, ending the War of the Sp. Succession. Pop. 246,760.

3. Tn of Natal, S. Africa. Fruit growing and stock-raising are carried on, wool is produced, and there are rich coal mines. The tn is the cap. of the dist. of U., which was annexed to Natal in 1903. It was formerly cap. of a small rep.

Utrillo, Maurice (1883-1955), Fr. painter, b. Paris. He was influenced at first by the Impressionists, but developed a personal style in painting the streets of

Montmartre, for which he had always a great affection. His street scenes with their white walls and houses belong to what is known as the 'white period' from 1907 to 1910. The so-called 'white and blue period' followed, but from 1917 onwards the calm beauty of his early work was exchanged for strident colour and less careful drawing. His later work disclosed something of a return to the style for which he is most, and highly, esteemed. See F. Carco, *La Légende et la vie de Maurice Utrillo*, 1928; also studies by G. Charensol, 1929, and M. Gauthier, 1944.

Uttar Pradesh (formerly the United Provinces of Agra and Oudh, and earlier NW. Province), state of India in the upper Ganges Valley, bounded on the N. by Himachal Pradesh and Tibet, on the E. by Nepal and Bihar, on the S. by Rajasthan, and on the W. by the Punjab. It is mostly a plain watered by the Ganges, with a spur of the Himalaya enclosing the N. border of the state. The climate is hot in summer, rather cold in winter in the plains; temperate in the hills.

History. U. P. can be called the heart of Hindustan, the most populous and long-settled part of India. It has formed part of every big empire that has held sway over the Indo-Gangetic plain as waves of invaders from the NW., Aryans, Turks, Mongolians, have paused at or near Delhi and built up their positions commanding the routes to the S. and E.

Agra was for long the Mogul cap. The Marathas in the 18th cent. gained control of much of Agra; Oudh became an independent kingdom under the former Mogul governor. In 1805-23 the British acquired much of the Ganges Doab (Agra) from the Marathas in the 2nd Maratha War, and the N. dists of U. P. after a war with Nepal. Oudh was annexed in 1856, a contributory factor to the Mutiny. Much of this rising was in the U. P.—Meerut, Kanpur (Cawnpore), Lucknow, Jhansi all being important names in the Mutiny.

The Presidency of Agra came into being in 1833. It was joined to Oudh as the NW. Province in 1856, the name becoming United Provs. of A. and O. in 1902.

Development. Two-thirds of the whole acreage of the state is under cultivation. Rice and wheat each account for 9,000,000 ac. Sugar, linseed, ground-nuts, maize millets, til, and cotton are also grown. 'Grow More Food' drives have raised outputs 10-15 per cent. 7,250,000 ac. are irrigated by state projects; 3,000,000 ac. by the Ganges Canals; wells irrigate a further 6,000,000 ac. U. P. is not very rich in minerals—it has some iron, coal, and manganese.

Industrially, Kanpur is one of India's leading cities—wool and cotton textiles and many other factories. Kanpur and Agra produce footwear and leather goods. Lucknow has a precision-instrument factory. Soap and vegetable oils are produced, and there are important local industries, especially metal-work and silk.

Culture. The lingua franca of India, Hindustani, is the language of U. P.—written with the Arabic script and called Urdu, or with the Devnagari script and with a minimum of Persian words and called Hindi. The language was developed around the Mogul Court, and owes much to both Persian and Sanskrit. U. P. thus has contributed to the creation of the language and to its literature. U. P. has 6 univs.: Allahabad, Lucknow, Agra, Roorkee, Benares Hindu, and Aligarh Muslim Univs. U. P. has some of the finest hist. monuments of India (e.g. the Taj Mahal) and many holy places of Hinduism.

Government. The governor acts through ministers responsible to an elected assembly of 430. U. P. has 34 representatives in the Upper and 86 in the Lower House of India's Parliament.

The cap. is Lucknow (pop. 497,000); other big tns are Kanpur or Cawnpore (pop. 705,000), Agra (pop. 376,000), Banaras or Benares (pop. 356,000), and Allahabad (pop. 332,000). Area 113,410 sq. m.; pop. 63,200,000. See also AGRA; OUDH.

Uttara-Mimamsa, see VEDANTA.
Uttoxeter, tn of Staffordshire, England, situated 12 m. NE. of Stafford. Biscuits, dairy produce, and agric. implements are made. Alleyne's grammar school was founded in the 16th cent. Pop. 7740.

Uu Nu (1907-), Burmese politician. He was elected President of the Student's Union 1935, and was a member of the goodwill mission to China, 1939; interned 1940. He was Foreign Minister under Ba Maw, 1943-5, Vice-President of the A.F.P.F.L., 1945-7; President of the Constituent Assembly, 1947 and Prime Minister, July 1947. Negotiated Treaty with Britain, Oct. 1947. Author of *Burma Under the Japanese*, *The People Win Through*, etc. Chancellor of Rangoon Univ., 1955. Resigned from Premiership June 1956. Now Prime Minister again.

Uusikaupunki, or **Nystad**, seaport tn of Finland, 40 m. NW. of Turku on the Gulf of Bothnia, in Turku-Porice. The treaty of Nystad in 1721 gave wide Baltic areas to Russia.

Uusimaa, co. of Finland, with a S. coast on the Gulf of Finland. Land area 4435 sq. m.; pop. 734,600.

Uvea, see LOYALTY ISLANDS.

Uvula: 1. Small cone-shaped hanging process suspended from the middle of the lower border of the soft palate. It is formed by the azygos uvulae, levator palati, and tensor palati muscles, mucous membrane, and connective tissue.

2. Small offshoot of the inferior vermis of the cerebellum, constituting the posterior limit of the fourth ventricle (see also BRAIN).

3. Slight elevation of mucous membrane projecting from the anterior and lower part of the bladder to the urethral orifice. This is known as the uvula vesicae.

Uxbridge, market tn and urb. dist. of Middx, England, situated on the R. Colne, near the Buckinghamshire border. It

had a mkt charter granted c. 1170 and became an important mkt tn and milling centre. Negotiations took place here in 1845 between the royalist and parl. forces in the Old Treaty House, now the Crown Inn. The par. church, mainly 14th and 15th cents., has a good hammer-beam roof. The industries include brewing, brick-making, iron-founding, light engineering, and mkt-gardening. In the urb. dist. are Harefield (q.v.) and Swakeleys, which has a fine mansion built 1629-38, now occupied by the Foreign Office Sports Association. Pop. 56,800.

Uyuni, tn of Bolivia, 125 m. SW. of Potosi; altitude 12,000 ft. It is an important rail junction for Chile and for Argentina. Pop. (mostly Indians) 6000.

Uzbekistan, or Uzbek S.S.R., constituent rep. of the U.S.S.R. The old kingdom of U. was formed of the ters. of Bukhara (q.v.) and Khiva in Central Asia, which, prior to the revolution of 1917, were under Russian suzerainty. In 1925 U. became an equal member of the Soviet Union. U. is bounded N. by Kazakhstan (q.v.), S. by Afghanistan, E. by the Kirgiz S.S.R. and Sinkiang (Chinese Turkestan), and W. by the Turkmen S.S.R. The cap. is Tashkent (q.v.). Other tns include Samarkand, Andizhan, Bukhara, Kokand, and Namangan.

The climate is rather dry, and with extreme variations from summer to winter. U. is a land of intensive farming based on artificial irrigation. It produces some 80 per cent of the cotton output of Central Asia. The irrigated area increased during 1938-40 by over 600,000 ac. The dam in the Katta-Kurgan valley is one of the largest reservoirs built in the world. The rearing of sheep is one of the oldest occupations of the pastoral pop. of U. Some of the collective farms possess up to 40,000 head of sheep and some state farms as many as 100,000. Grain is grown, but not more than sufficient for local consumption. Fruit, grapes, rice, hemp, wool, and silk are also produced. In Kara-Kalpak, in addition to cotton, rice and lucerne are leading crops. The largest cultivated area is around Tashkent; cotton and sugar-beet are the chief crops. There is an abundance of fish in the estuary of the Amu-Darya. Afforestation has been widely carried out. Oilwells have been estab. near Bukhara and in the Fergana valley. The ann. pro-

duction of the Uzbek oilfields now exceeds 1,000,000 tons, half being refined locally. Of the mineral resources, in addition to oil and coal, copper, and non-ferrous metals are mined at Amalyk, near Tashkent. Wolfram, molybdenum, and radium are found and ozocerite deposits are also exploited. The most important industries of U. are those based on the products of agriculture, and of these cotton textiles occupy the leading place, the largest cotton mills being those in Tashkent. Begovat is an important metallurgical centre. Other well-developed industries include the manuf. of vegetable oil from cotton seed and agric. machinery at Tashkent; fruit preserving and canning, tanneries, leather and boot manufs. Other industrial products are cement, sulphur, nitrogenous fertilisers, oxygen, paper, jute, and hydro-electric plants. The area is 157,400 sq. m. The pop. numbers 6,360,000, 72 per cent being Uzbeks, and 11 per cent Tajiks. *See also CENTRAL ASIA, RUSSIAN; RUSSIA. See W. Olafsen, The Emir of Bokhara and his Country, 1911; E. R. Christie, Through Khiva to Golden Samarkand, 1925; A. L. Strong, Red Star in Samarkand, 1930; E. S. Bates, Soviet Asia, 1942; R. A. Davies and A. J. Steiger, Soviet Asia, 1943; Shabad, Geography of the U.S.S.R., 1951.*

Uzbeks, or Uzbegs, Turkic people named after Uzbek, a descendant of Genghis Khan. They appeared in Transoxania in the 15th cent., and in the 16th cent. founded the Kingdoms of Bukhara and Khiva. They are now largely concentrated in the Uzbek S.S.R. of the Soviet Union and number about 6,000,000. They are Muslims and speak the Uzbek language, which is now written in the Cyrillic character.

Uzhgorod (Ukrainian Uzhhorod, Czech Uzhhorod, Hungarian Ungvár), cap. and cultural centre of the Transcarpathian Oblast (see TRANS-CARPATIA) of the Ukraine. There is some industry. It has a univ. (1946), and there are 12th-18th-cent. architectural monuments. In the 19th cent. U. was the centre of both the Ukrainian and Russophile movements in Transcarpathia. It has been cap. of Transcarpathia since 1919. Pop. (1956) 43,000, Ukrainians, Hungarians, Jews.

Uznam, see USEDOM.

Uzziah, see AZARIAH.

V

V, twenty-second letter of the Eng. alphabet, is interchangeable with *u*, *w*, *f*, *b*, and *m*. The auct. Greeks had apparently no *v* sound, but in modern Greek (which has no *b* sound) the letter *beta* is used for the sound *v*. The Cyrillic alphabet (ancestor of the Russian, Bulgarian, Serbian, and Ukrainian alphabets), which descended from the Gk, employed the Gk *β* for the sound *v*, and added a variation of *beta* for the sound *b*. The Romans wrote *v*, which had the value either of the consonantal *v* or the vocalic *u*, although the fact that they employed one character for both *u* and *v* has induced some scholars to think that the Lat. *u* had the phonetic value of Eng. *w*. However, while in the early Lat. script and even the later Rom. monumental character there appears only the letter *v*, having both the phonetic values (*v* and *u*), in the later Lat. cursive scripts, there is only the letter *U*, but also employed either as *v* or as *u*. Only in the later Middle Ages and in modern times is the *V* constantly employed for the consonantal sound, and *U* for the vowel-sound. The interchangeability of *v* with *f* and *w* appears not only in the auct. Lat. alphabet, where the letter *F* was an indirect descendant of the Gk *digamma*, but also in the mod. Ger. alphabet, where the letter *v* is pronounced *f*, and the Eng. sound *v* is generally expressed by the letter *w*. In the Polish alphabet there is no letter *v*, and the Eng. sound *v* is represented by the letter *w*. The Eng. letter *v* is phonetically a pressed or medial labial aspirate, bearing the same relation to *f* that *b* does to *p*. See ALPHABET.

Vaago, one of the Faeroe Is. (q.v.). Area 70 sq. m.; pop. 2260.

Vaagsoy, is. of Norway, 100 m. N. of Bergen. There is a fish-processing plant. Developed by the Germans as a refuelling base and radio station after their conquest of Norway, *V*. was the objective of the first Brit. 'combined operation,' on 27 Dec. 1941, simultaneously with a raid on Maaloey. Pop. 3500.

Vaal, riv. of S. Africa, trib. of the Orange R., which rises in Mt. Kilipetapel, flows W. and SW., separating the Orange Free State from the Transvaal and crosses Griqualand W. The *V*. Barrage, 19 m. down from Vereeniging, retains the riv. for 42 m. forming a reservoir for 14,000,000,000 gallons, to implement the Rand water supply. Large areas are also irrigated. The *V*. Dam, 18 m. up the riv. from Vereeniging, forming the largest man-made lake in the S. Hemisphere (1956), is the Rand's main water supply. There are diamond diggings in and near the bed of this riv.

Vaasa: 1. Co. of Finland on the coast of the Gulf of Bothnia. Area 15,062 sq. m.; pop. 628,500.

2. Cap. of the above, a port on the Klemetsö peninsula. There are manufs.

of machinery, woollen goods, soap, and sugar. Pop. 38,900.

Vaca, Alvar Nuñez Cabeza de (1490-11564), Sp. colonial governor and explorer, *b*. Jerez de la Frontera. He is celebrated in the annals of the conquistadores and was the first European who traversed the ter. later known as New Mexico. In 1528 he took part in the expedition of Pamphilo (Panfilo) de Narvaez to Florida, in which Narvaez perished. *C. de V.* and some 3 companions, however, were cast ashore on the coast of Texas, their subsequent progress forming one of the most remarkable stories of adventure. He was made *adelantado* or administrator of the prov. of Rio de la Plata (1540), and he led an expedition to Paraguay, where he was received as governor (1542-4). Sev. jealous Spaniards intrigued against him, and he was sent to Spain for trial. In 1556 he was acquitted but was not reinstated in his governorship. His reports of the Narvaez expedition led directly to the expeditions of Niza (1539) and Coronado (1540-2). His *Naufraios* was pub. in 1544 (Eng. trans. by B. Smith, 1851). The events of his S. Amer. expedition are narrated in his *Comentarios*, 1555.

Vaccination (from Lat. *vacca*, a cow), inoculation with cow-pox in order to afford protection against small-pox. The idea of vaccination first occurred to Dr Edward Jenner (q.v.) (1749-1823) in connection with a belief popular in his native co. of Gloucester, that persons infected with cow-pox were thereby rendered immune from small-pox. His views met with opposition among medical men of the best reputation, and it was not until 1798 that he succeeded in demonstrating that vaccinated subjects were immune, at least for a time. *V.* was made compulsory in a number of countries. The opponents of *V.* point, however, to the fact that erysipelas and even syphilis have been caused or communicated by cow-pox inoculation. Now that the use of glycerinated calf lymph is general the danger of syphilis is obviated, and it is generally conceded that the marked good effects produced by the general practice of *V.* more than compensate for the remarkably few cases in which the inoculation terminates unfortunately.

The first *V. Act* in England, that of 1840, provided means of *V.* but left the use of them to voluntary decision. In 1853 *V.* was made compulsory. The Act of 1898 required parents to procure the *V.* of their children within 6 months from birth, unless they had within 4 months of birth satisfied a court of petty sessions that they had a conscientious belief that such *V.* would be injurious to the health of the child.

Under the National Health Service Act of 1946, which came into operation on

5 July 1948, V. is no longer compulsory in Great Britain, though it is nonetheless a wise precaution. See SMALLPOX.

Vaccine-therapy, method of curing and preventing infective diseases by inoculation with the causative micro-organisms in a modified form. The theory owes its origin to Dr Jenner's (q.v.) discovery of vaccination (q.v.) in the restricted sense.

As a result of the pioneer work of Pasteur (q.v.) and also that of Sir Almroth Wright, not only has the method been extended to preventive inoculation of a number of other diseases, but patients have been inoculated while they were actually attacked by the disease, and the hist. of the method shows that it is a valuable addition to therapeutics. The danger to health involved in bacterial infection depends mainly upon the production of toxins or bacterial poisons, which in some cases are extremely virulent. The disease is fought in normal cases by the destruction of bacteria (a work in which the white corpuscles are especially engaged (see PHAGOCYTOSIS)), and by the neutralisation of the toxins by substances called anti-toxins, which are elaborated by the body, under the stimulus of the disease-attack. Invading poisons are referred to generally as 'antigens,' and the substances produced in the blood to combat antigens are referred to as 'antibodies.' One injection method involves adding to the anti-toxic properties of the blood by the use of antitoxic sera (see SERUM THERAPEUTICS). In this method the injected serum contains, not bacteria, but only the anti-toxic substances elaborated by the horse or other animal inoculated with the disease. V., on the other hand, involves the injection of the organisms themselves or their products. The principle underlying the method is the stimulation of the healing powers of the body generally to conquer infection by increasing the antibodies. Normal human serum has what is called an opsonic action on bacteria; that is, it makes them more susceptible to destruction by the white corpuscles. In any particular case of disease the opsonic power of the patient's serum is compared with that of normal serum, the result being a ratio which is called the opsonic index. Inoculation of a vaccine at first decreases the opsonic power—the 'negative phase'—and later increases it, so that a lasting 'positive phase' is induced.

The preparation of vaccines consists in making cultures of the bacteria on a suitable medium, adding sterilised saline to form an emulsion, and subsequently heating this long enough to kill the bacteria. Various chemical agents, such as formalin and phenol, may be employed instead of heat. Before use, the emulsion is standardised by dilution with sterile normal saline until it corresponds with a standard emulsion. Standardisation was originally carried out by counting the number of bacteria per unit volume. When V. was first introduced, autogenous vaccines, i.e. vaccines prepared from the bacteria causing the infection, were generally used; in exceptional cases stock

vaccines were employed. The use of the latter has now become much more general, and is of advantage when the infecting bacteria are of the same strain as those in the vaccine. When different strains, such as those of *Bacillus coli*, exist, autogenous vaccine ensures the use of the right strain; others may be useless and even harmful. Whatever its source, *Bacillus typhosus*, the bacterium causing typhoid fever, yields a vaccine giving immunity from typhoid fever in all parts of the world. *Staphylococcus aureus*, a bacterium causing suppuration, is equally useful in the preparation of stock vaccines, but in many other cases autogenous vaccines are preferable. The prophylactic use of V. was considerably extended during both World Wars, when troops were inoculated against cholera (q.v.), typhoid and paratyphoid fevers (q.v.), and tetanus (q.v.). Vaccines are used also as a preventive against plague (see TROPICAL MEDICINE), whooping cough, colds, pneumonia, tuberculosis (q.v.), and poliomyelitis (q.v.).

In the case of some of the infective diseases, such as cholera and plague, re-inoculation must be made frequently, as immunity lasts for only a few months. V. is also of great value in the prevention of diphtheria (q.v.); the material used for inoculation (immunisation) is *toxoid*, i.e. the toxin rendered less harmful by treatment with formalin. See also under BACTERIA, Immunity.

See C. H. Browning and T. J. Mackie, *Manual of Bacteriology* (11th ed.), 1949.

Vaccinium, a genus of deciduous and evergreen shrubs, family Ericaceae, about 130 species, found in the N. hemisphere, chiefly N. America and E. Asia; *V. angustifolium* is the Blueberry; *V. macrocarpon*, the Cranberry; *V. myrtillus*, the Bilberry or Whortleberry; and others yield edible fruits of some importance. Many V.s are bog plants, and all prefer acid, lime-free soils.

Vaughan, Horace Annesley (1861-1955), novelist, b. Sydenham, Kent. He went to Harrow, about which he wrote his famous school story *The Hill*, 1905, and then to Sandhurst, obtaining a commission in the Rifle Brigade. In 1883 he resigned and went to California, where he wrote his first novels. In 1894 he returned to England, and in 1904 scored a success with *Brothers*; among the best known of many other novels are *John Verney*, 1911, *Szrocc's Canyon*, 1914, *Quinney's*, 1914, *The Triumph of Tim*, 1916, *Fishingle*, 1917, *The Soul of Susan Yellam*, 1918, *Quinney's Adventures*, 1924, *Joe Quinney's Jodie*, 1936, *Lord Samarkand*, 1938, and *Quinney's for Quality*, 1938. He wrote a number of plays as well as dramatising some of his novels. *Fellow Travellers*, 1923, and *Distant Fields*, 1937, are autobiographical, and his hundredth book, *Quests*, a collection of essays, was pub. shortly after his ninety-second birthday. Other late works are the anecdotal memoirs, *Methuselah's Diary*, 1950, and *From Methuselah*, 1951.

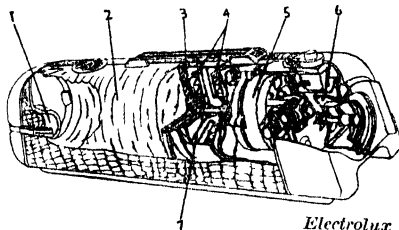
Vacuum. A V. denotes a space which is completely devoid of matter, but the

meaning of the term, as used in physics, is extended to any enclosure in which the gas pressure is considerably less than atmospheric. A *high V.* is one in which the pressure is very low, a *low V.* being one in which the pressure is not so low. Methods of obtaining vacua are described under AIR-PUMP (see also CONDUCTION OF ELECTRICITY). Until the time of Galileo, Aristotle's dictum that 'Nature abhors a vacuum' was accepted as a natural principle. The principle was, however, refuted in the 17th cent. through the so-called *Torricellian V.*, though Torricelli's *V.* was really saturated with mercury vapour at a low pressure (see also TORRICELLI, EVANGELISTA). It is impossible to obtain a perfect *V.*, present methods of exhaustion always leaving some residual gas—though the amount may be extremely minute. A *V.* is a non-conductor of heat and will not transmit sound waves. Heat, light, and other electro-magnetic radiations are transmitted through a *V.*, just as they are through interstellar space.

Modern diffusion pumps (q.v.) can reduce the pressure inside a vessel to well below 10^{-6} mm. of mercury, a pressure of the order of 10^{-3} of atmospheric pressure. The vacua obtained by means of pumps can be increased by introducing substances which absorb gases, such as activated charcoal and the best modern methods can produce vacua of approximately 10^{-10} mm. of mercury.

See L. H. Martin and R. D. Hill, *Manual of Vacuum Practice*, 1947; S. Dushman, *Scientific Foundations of Vacuum Technique*, 1949; J. Yarwood, *High Vacuum Technique*, 1955.

Vacuum Cleaners, type of air suction pump used for extracting dust from carpets, furnishings, etc. The first *V. C.s.*, which were invented at the beginning of the present cent., were operated by hand.



VACUUM CLEANER

The modern type of domestic suction cleaner is operated by means of a high-speed electric motor. The nozzle communicates with a dustbag which collects the dust and filters the dust-laden air on its way out into the atmosphere. The fan that produces the suction is situated in the airways and is usually directly coupled to the armature shaft. Domestic suction cleaners may operate at high suction or have less suction and utilise a revolving brush, which beats the surface

of the carpet, distributing the dirt, which is picked up by the air stream and conveyed to the dustbag. A machine of the first type is illustrated. The cleaning nozzle is usually connected to the machine by rods and a flexible hose, thus giving a wide range of use. The dust-laden air is drawn up the rods and hose and through the socket (1) into the dustbag (2), which filters the air, the dust, etc., being retained in the bag and the filtered air passing through the perforated plate (3) into the fans (4) and a stationary air guide (7), from which it is passed around the motor (5) to the air-purification pad (6), where the air is further filtered and purified before passing out of the blowing end of the machine into the atmosphere. The cost of running domestic cleaners is very low, as in most cases they do not require more than $\frac{1}{4}$ kW.

Vacuum Flask, invented by Sir James Dewar to store liquid air. Very little heat enters by *conduction* because glass is a bad conductor, and the vacuum between the glass walls is a worse one. This vacuum, if perfect, would entirely prevent *convection*. Since a vacuum favours the passage of radiation the walls are silvered inside the vacuum; any heat getting into the vacuum is reflected back. The idea has since been commercialised under Thermos and other trade-marks or names. The *V. F.* keeps liquids hot for the same reasons that it keeps them cool.

Vacuum Pump, see AIR PUMP.

Vacuum Tubes, see VALVES; FLUORESCENCE; NEON; SPECTRUM AND SPECTROSCOPE; X-RAYS.

Vaduz, cap. of Liechtenstein. Above the town stands the castle of the ruling house. There are textile manufs., and a trade in corn, wine, livestock, and vegetables. Pop. 2800.

Väg, see VÄH.

Vagrants, in law connote idle and disorderly persons of any of 3 grades liable to various terms of imprisonment. These grades are defined by statute as idle and disorderly persons, rogues, and vagabonds, and incorrigible rogues. In the 15th cent. many laws were passed against 'vagabonds,' as they were generally called, and persons who could not find employment seem to have been confounded with those who preferred idleness and thieving. Laws against vagabonds in the 16th cent. were closely connected with compulsory labour, and under these circumstances harsh and cruel statutes were passed in the reigns from Edward VI to Elizabeth I. In 1713 an Act was passed for reducing the laws relating to rogues, vagabonds, sturdy beggars, and vagrants into one Act and for more effectually punishing them and sending them to their homes, the manner of conveying them including whipping in every case, through which they passed. This Act was repealed and replaced by the Consolidation Act of 1740, which made a distinction between idle and disorderly persons, rogues and vagabonds, and incorrigible rogues. The laws relating to these categories and other *V.* in England were again consolidated and amended in 1822 by a temporary Act

which was soon superseded by the Vagrancy Act of 1824, which, with some amendments and additions, includes the law relating to mendicity, together with provisions concerning persons deserting or neglecting their families. This Act, in its broad essentials, remains on the statute book to-day, though frequently amended in some of its details. In the category of idle and disorderly persons it includes prostitutes behaving riotously or indecently in places of public resort; pedlars trading without a licence; persons loafing about any public place to beg alms; and others. In the category of rogues and vagabonds are included persons convicted of an offence which, if it had been the first occasion, would have constituted them idle and disorderly persons; fortune-tellers; persons obscenely exposing their persons; persons exposing wounds or deformities to obtain alms; persons who persistently solicit in a public place for immoral purposes; persons armed with offensive weapons with intent to commit a felony; and reputed thieves or suspects frequenting various specified places with intent to commit a felony. The category of incorrigible rogues includes persons convicted a second time as rogues and vagabonds. Offenders in classes (1) and (2) may appeal to Quarter Sessions and those in class (3) from Quarter Sessions to the Court of Criminal Appeal. The penalties under the Act include imprisonment for 14 days (formerly with hard labour), or, if convicted before 3 justices, 3 months, or a fine. The Vagrancy Act of 1873 included in class (2) persons betting in the street or other public place. Numerous Acts dealing with the practice of palmistry and fortune-telling by gipsies were passed at different times beginning in 1530. They were superseded by the Act of 1824. The provisions respecting prostitutes above noted were strengthened by a special Act of 1839 applied to London only for the prevention of loitering for the purpose of prostitution or solicitation to the annoyance of other people. The Vagrancy Act of 1935 amends the Act of 1824 so far as it relates to persons wandering abroad and lodging in barns, tents, etc., 'without visible means of subsistence.' These latter quoted words are repealed, and a person so wandering and lodging will not be deemed a rogue and vagabond unless he fails to apply for, or refuses to go to, a reasonably accessible place of shelter, or persistently wanders abroad notwithstanding that places of shelter are available or, by so lodging, causes damage to property or infection with vermin. A 'place of shelter' in this context means a place where provision is regularly made for giving, free of charge, accommodation for the night. The reference to a person lodging in a tent, etc., does not include one lodging in a tent or in a cart, etc., in which he travels—a concession to the 'hiker.'

Váh (Ger. *Waag*; Magyar *Vág*), riv. of Czechoslovakia, which rises in the Carpathians (q.v.) and flows W. and then S. through the regions of Žilina, Bratislava,

and Nitra (qq.v.) to join the Dunaj (see *DANUBE*) near Komárno (q.v.). Length 210 m.

Vahram, see *BAHRAM*.

Vair, Guillaume du (1556–1621), Fr. orator and moralist, b. Paris. As a councillor of the parlement of Paris he pronounced his famous discourse which, though apparently an argument for the Salic Law (q.v.), was really an attack on the proposal of the Leaguers to give the crown of France to the infant of Spain. On philosophy he wrote *Philosophies des Stoïques* and *Traité de la Sainte Philosophie*, in which he abandons the idea of secularising moral philosophy and, anticipating Pascal, urges the necessity of a return to Christian morality as the only means of defeating corruption.

Vaishnavas, sect of the Hindu religion, distinguished from the others by the special worship of Vishnu, who, they hold, is supreme over the other gods of the Trimurti.

Vajda, János (1827–97), Hungarian poet and essayist, b. Pest, where he became a journalist. He married Lóza Bartos in 1880. His reputation is secured by his philosophical and love poetry, which shows little influence of his contemporaries. He d. in Budapest.

Val de Travers, valley of Switzerland in the Jura Alps, 13 m. SW. of Neuchâtel. The well-known asphalt is named after it.

Valaam (Finnish *Valamo*), small is. in the N. of Lake Ladoga with the famous V. Russian Orthodox monastery dating from the 12th or 14th cent., which was an important frontier fortress often ruined by the Swedes. The monastery, with its extremely strict rules and obligatory work, developed model dairy and garden farming and attracted many pilgrims. V. belonged to Finland 1918–40. The monks left V. in 1940.

Valais (Ger. *Wallis*), mountainous canton of SW. Switzerland, occupying the basin of the upper Rhône R. The canton is trilingual, French, Swiss-German, and Italian, according to the district, being spoken by the inhab. It is one of the most picturesque cantons of Switzerland, with lofty mts and numerous glaciers. There are orchards and vineyards, and deposits of limestone, marble, anthracite, lead, and iron. V., though a largely unproductive area, is famous for its excellent wines. The canton is crossed by the Lötschberg and Simplon railways, and roads lead over the Great St Bernard and the Simplon passes to Italy. There are many resorts and sport centres. The canton became a part of the Swiss confederation in 1815. Cap. Sion. Area 2021 sq. m.; pop. (1955) 165,500, mainly Rom. Catholics.

Valdemar I (1131–82), King of Denmark, surnamed the Great, the posthumous son of Canute Lavard. He became king in 1157, and with Absalon (q.v.) ruled the country firmly and well.

Valdemar II (1170–1241), King of Denmark, succeeded his brother, Canute VI, in 1202. He obtained possession of Lübeck and 2 other equally important bishoprics, and by treaty and friendship

with Frederick II, the emperor, obtained all the Wend lands and the lands of N. Germany.

Valdemar IV (1320-75), King of Denmark, came to the throne in 1340. The guiding motive of his policy was to obtain possession of those terts, which formerly belonged to the Dan. crown and which were now scattered. By 1360 practically all the old Dan. lands, including Scania, were in his hands.

Valdivia: 1. S. Central prov. of Chile. It is richly stocked with forests, the export of various kinds of timber being a prin. industry. Area 8080 sq. m.; pop. 232,647.

2. Cap. of the above, a commercial port 11 m. up the R. V., founded in 1552 by Pedro de V., the conqueror of Chile. It is situated at the junction of the Rr. Calle-Calle and Cruces, 440 m. S. of Valparaiso by air. Opposite the city is



Swiss National Tourist Office

GRIMENTZ, VAL D'ANNIVIERS

A typical village in the Valais, Switzerland.

Valdenses, see WALDENSES.

Valdepeñas, Sp. tn in the prov. of Ciudad Real. It produces a well-known red wine. Pop. 30,000.

Valdes, Juan de (c. 1500-44). Sp. reformer, b. Cuenca. His brother being imperial secretary of state, he obtained the post of secretary to Charles V of Germany, and afterwards acted in the same capacity to the viceroy in Naples. While there he attempted to bring about the regeneration of the Church. He wrote *Spiritual Milk*, *The Christian Alphabet*, and commentaries on the N.T. See F. C. Church, *The Italian Reformers, 1534-64*, 1932; G. K. Brown, *Italy and the Reformation to 1550*, 1933.

Teja ls., 3 m. long and over 1 m. wide, where are situated tanneries, shoe and furniture factories, shipyards, flour-mills, sugar-refineries, and breweries. Pop. 45,138.

Valdosta, city of Georgia, U.S.A., on the Atlantic coast. It is the port for the local cotton and fruit trade. It manufactures naval stores, lumber, veneer, boxes, cigars, cottonseed oil, feed, and pecan and metal products; there are also railroad shops. Georgia State Woman's College, Emory Junior College, and Moody Air Force base are here. Pop. 20,046.

Valence, Fr. tn, cap. of the dept. of Drôme, built on an escarpment above the Rhône (q.v.), 344 m. S.E. of Paris. It

was once the cap. of the duchy of Valentinois, which Louis XII gave to Cesare Borgia (q.v.). There is a Romanesque cathedral, and there are manufs. of foodstuffs, textiles, and leather goods, and there is a trade in agric. produce, wine, and olives. Pop. 40,000.

Valencia, Duke of, see NARVAEZ, RAMON.

Valencia: 1. Region in Spain, on the Mediterranean, comprising the provs. of Alicante, Castellón de la Plana, and V. (q.v.). It was formerly a kingdom, was taken from the Moors by the Cid (q.v.) at the end of the 11th cent., and was incorporated with Aragón (q.v.) in 1238. It remained a kingdom in name until the 18th cent. Area 8966 sq. m.; pop. 2,341,000.

2. Sp. prov., in the Region of V., with a coast-line on the Mediterranean. It is watered by the Guadalaviar and the Júcar (q.v.), is mountainous in the interior, and has a fertile, irrigated coastal plain of *huerta* country. Its orange groves are famous, and olives, grapes, mulberries, figs, and rice are also produced. Area 4231 sq. m.; pop. 1,371,800.

3. Sp. tn, cap. of the prov. of V. (and, formerly, of the kingdom of V.), on the estuary of the Guadalaviar. It is the third city of Spain, and has a port, El Grao, and beaches on the nearby Mediterranean coast. The beautiful and productive garden-land (*huerta*) around the city is irrigated by anct canals; these are administered by a court which meets each Thursday at the main door of the cathedral. The Gothic and Baroque cathedral was begun in 1202. There are sev. other fine churches, and there are palaces, mansions, museums, and a 15th-cent. silk exchange. The univ. dates from 1500. There are textile, metallurgical, and boatbuilding industries, and a large trade in oranges, rice, and silk. Pop. 524,800.

4. Tn of Venezuela, on the Cabriales R., 80 m. WSW. of Caracas, with which it is linked both by road and rail, W. of Lake V. It is the cap. of the state of Carabobo. It ranks next to Caracas as a social centre and has a cathedral. There are important cotton mills, soap and cement factories, and an airport. Pop. 88,700.

5. Is. off Ireland, see VALENTIA.

Valency. Expressed in its simplest form, the V. of an element is the number of atoms of hydrogen, or of any other standard univalent element (or radical such as CH₃), capable of uniting with one atom of the element. The elements themselves are termed *uni*-, *bi*-, *ter*-, and *quadi*-*valent*, according to the number of univalent atoms with which they can unite. Measured by their combining capacity, elements do not always exhibit the same V. Thus 1 atom of phosphorus is satisfied with 3 atoms of hydrogen, but can combine with 5 atoms of chlorine. The V. of an element is therefore often a variable quantity, and, in many cases, dependent upon temp. and pressure. Thus if the compound PH₃ (phosphine) be mixed with hydrochloric acid (HCl) and the mixture subjected to pressure, a

crystalline compound, phosphonium chloride (PH₄Cl), is formed in which the phosphorus atom is *quinqivalent*. Where, in a compound, an atom is not functioning in its highest recognised V., there is a tendency for the compound to unite with additional atoms to form new compounds. Thus carbon monoxide (CO), in which the carbon (a quadrivalent element) is apparently functioning as a bivalent element, unites with an atom of oxygen to form carbon dioxide (CO₂), where carbon exhibits its normal V. In some cases, molecules of different compounds, in which all the atoms are fully satisfied, unite to form other compounds. Thus hydrogen fluoride and potassium fluoride combine to form the compound hydrogen-potassium fluoride (HF + KF = KHF₂). In simple cases, the relation

$$V. = \frac{\text{Atomic Weight}}{\text{Equivalent Weight}}$$

holds good. But it is now realised that there is no hard-and-fast definition of V.

Werner's Theory has been especially fruitful in predicting new types of compounds. The Electronic Theory of V. appears to be firmly estab. There seem to be 2 kinds of V. linkage between atoms: (1) polar linkages, binding together atoms electrically opposite in character, e.g. in NaCl; (2) non-polar links as in most organic compounds, e.g. CCl₄. The existence of such bodies as CoCl₂(NH₃)₆ is explained by co-ordinate linkages. The whole question of V. is closely bound up with that of the structure of the atom. See also CHEMISTRY; DIPOLES. See J. C. Speakman, *An Introduction to the Electronic Theory of Valency*, 1935.

Valenciennes (Lat. *Valentianae*), Fr. tn, cap. of an arron., in the dept of Nord. It has fortifications designed by Vauban (q.v.), and sev. fine churches. The museum is rich in Flem. and Fr. 18th-cent. paintings. The tn was badly damaged in the Second World War. It was the bp. of Baldwin I, Froissart, Watteau, and Carpeaux (q.v.). It has an important metallurgical industry, and manufs. hosiery and glass. The famous lace industry is being revived. Pop. 38,700.

Valens, Flavius (AD 328-378), emperor of the E. During his reign, which began in 364, the Goths were admitted into the countries S. of the Danube. V. was defeated by them on 9 Aug. 378, and was never seen again.

Valentia, or **Valencia**, small rocky is. off the coast of Kerry, Rep. of Ireland, where there are sev. cable and signalling stations, and a small harbour. V. is important as being the site of a meteorological observatory. Pop. 1500.

Valentine, St. priest and physician of Rome who suffered martyrdom probably during the persecution under Claudius II in 269. His feast is on 14 Feb. The custom of sending valentines probably had its origin in a heathen practice connected with the worship of Juno Februaria at the Lupercalia (q.v.), or perhaps in the medieval belief that birds commenced to mate on 14 Feb.; its association with the saint is wholly accidental.

Valentine and Orson, known to medieval romance as the sons of the Emperor of Greece, fortuitously connected with the Charlemagne romances. Their story is of folklore origin, being based on the common folklore legend of a man reared by a bear (Orson = *Ours*son = bear's son). Versions exist in many languages. A chap-book dealing with them was pub. in Glasgow as late as 1850.

'Valentine State,' see ARIZONA.

Valentinian, name of 3 Rom. emperors: *Valentinian I*, *Flavius* (AD 321-75), b. Pannonia, the son of Gratian, whom he succeeded in 364. The frontiers of the empire were exposed to great danger during his reign. Through his gen., Jovinus, he gained a victory over the Alemanni in 366. In 368 the Alemanni renewed their attacks upon E. Gaul, but V. drove them back. This emperor was a man of ability and a wise administrator. *Valentinian II*, *Flavius* (371-92), b. Milan, son of Valentinian I, came to the throne in 375. He was at first an Arian, but later abandoned this heresy. *Valentinian III*, *Placidius* (419-55), son of Constantius III, was created emperor of the W. by Theodosius II, emperor of the E., in 425. Weak and vicious, he was dominated by favourites, and in 455 he was slain by Maximus.

Valentino, Rudolph (1895-1926), Amer. film-actor, b. Castellana, Italy. His full name was Rudolph Alphonso Guglielmi di Valentino d'Antongulella. In 1913 he emigrated to the U.S.A. to take up farming, but became a dancer, partnering Gaby Deslys in London. He was 'discovered' by Rex Ingram, and in 1922 made his first film, *The Four Horsemen of the Apocalypse*. His first performance was in *Monsieur Beaucaire*; other famous films in which he appeared were *The Sheik*, and *Blood and Sand*. His magnetic charm and his vivid rendering of highly romantic scenes won him the adulation of large numbers of women filmgoers. This at times approached hysteria, and there were scenes of frantic grief at his death, his memory becoming something of a cult for a time. See lives by Natacha Rambova, 1927, and S. G. Ullman, 1927.

Valentinus (d. c. 160 BC), one of the most famous of the Christian Gnostics (see GNOSTICISM). b. Egypt. He was educ. at Alexandria, but went to Rome about AD 140. He found many adherents (*Valentinians*), especially in the E.

Valera, Eamon de, see DE VALERA.

Valerian, or Publius Licinius Valerianus, Rom. emperor AD 253-60; gen. and faithful supporter of Gallus, after whose death he was proclaimed emperor by the soldiers. V. took his son Gallienus as colleague, and, leaving him in charge of affairs in Europe, set out for the E. to crush the Persian Sapor I (257). After some success he was entrapped by Sapor and kept prisoner till his death. At first tolerant towards the Christians, V. later became hostile towards them. See Gibbon, *Decline and Fall*, chapter X.

Valeriana, or **Valerian**, family Valerianaceae, genus of perennial herbs and subshrubs, mostly of N. temperate regions, a

few tropical, with cymes of white or pink flowers. *V. officinalis*, common. *V. Cat's V.*, or St George's Herb, or All-heal, beloved by cats, and *V. dioica*, Marsh V., are native to Britain. *V. pyrenaica*, from the Pyrenees, is naturalised locally. *V. saluina*, and *V. supina* are rock garden subjects.

Valeric or **Valerianic Acid** (C₈H₈COOH), mixture of acids obtained by distilling the macerated plants valerian or angelica with water. It is an oil liquid with an unpleasant smell (boiling point, 174° C.). There are 4 isomers with this molecular formula, of which isovaleric or isopropylacetic acid and optically active valeric methylethylacetic acid are the most important.

Valerius Flaccus, see FLACCUS.

Valerius Maximus (fl. AD 30), Rom. historian and a friend of Sextus Pompeius, whom he accompanied to the E. in 27. His *Factorum et Dictorum Memorabilium Libri IX* is interesting as a specimen of the transition from classical to 'silver' Latin. It has been ed. by C. Kempf (2nd ed., 1888).

Valéry, Paul (1871-1945), Fr. poet, b. Sète of a Fr. father and an It. mother. Educ. at Montpellier, he then studied law. In Paris he became one of the familiars of Stéphane Mallarmé, the symbolist, and proved himself an apt pupil. Some of his prose and verse pieces appeared in magazines, and he worked out a scheme of what he called 'pure poetry' in which the music was far more important than the meaning. In 1917 he collected the verses he had written, and they were pub. under the title *La Jeune Parque*. *Le Cimetière Marin* and *Album de vers anciens* followed in 1920; his prose work, *La Soirée avec M. Teste*, also in 1920, and *Le Serpent*, in verse, 1921. In 1925 he was elected to the Fr. Academy. V. believed that poetry must produce 'enchantment'; to secure this effect the poet must believe in the power of the word and still more in the efficacy of the sound of the word than in its significance.

V.'s famous poems *La Jeune Parque*, 1917, and *Charmes*, 1922, 1926, were so irresistible in their mere incantation that they were soon known by heart. Poetry was for him the expression of intense meditation, and as a result his meaning is often obscure. No Fr. poet, however, could rival his ability in creating a new poetic syntax or in annexing a whole unexplored domain of sensibility. His lyricism, too, was infused into his prose. His *Oeuvres complètes* were pub. in 12 vols., 1931-9. See studies by A. Thibaudet, 1923, and V. Larbaud, 1931; F. Porché, *Paul Valéry et la poésie pure*, 1926; A. Maurois, *Introduction à la méthode de Paul Valéry*, 1933; M. Raymond, *Paul Valéry et la tentation de l'esprit*, 1946; D. Saurat, *Modern French Literature*, 1946; H. Mondor, *Trois discours pour Paul Valéry*, 1948; M. Bémol, *Paul Valéry*, 1949; F. Scarfe, *The Art of Paul Valéry*, 1954; J. Charpier, *Essai sur Paul Valéry*, 1956.

Valetta, see VALLETTA.

Valhalla, in Norse mythology the hall (*halla*) in Asgard (q.v.) of the slain (*valr*),

where Odin receives the spirits of dead heroes. These issue forth each morning from its 540 gates to fight and return at dusk to feast, the gods acting as their hosts and the Valkyries (q.v.) as servants. In modern times the word signifies a tomb of illustrious soldiers, as the Pantheon near Regensburg for Germany's heroic dead. See BRAGI.

Valkyries (Ger. Walküre), the awe-inspiring maids of Odin who fly over the field of battle choosing those to be slain and afterwards taking them to Valhalla (q.v.). See BRUNHILDA.

Valladolid, see MORELIA.

Valladolid: 1. Sp. prov., in León (q.v.). It is largely open country, watered by the Duero (q.v.) and its tribs. It is called the granary of Spain, and produces, in addition to cereals, fruit, oil, wines, and honey. There are textile, metallurgical, and tanning industries. Area 2923 sq. m.; pop. 351,700.

2. (anc. Vallata Ualiti) Sp. tn, cap. of the prov. of V., on the Pisuerga. The archiepiscopal cathedral, begun in 1585, is still unfinished. There are many Gothic and Baroque churches, rich in sculpture, and a univ. (1346). The house of Cervantes (q.v.) still exists. V. was the seat of the court at one time, and Philip II (q.v.) was b. here. Columbus d. in the tn. There are textile, iron, paper, and engineering industries. Pop. 126,350.

Vallata Ualiti, see VALLADOLID.

Valle, Pietro della, or **le Pellegrino** (1586-1652), It. traveller. His journeys in the E. were described in his *Travels in India and Persia* (pub. 1658-63).

Valle d'Aosta, region (*compartimento*) of NW. Italy, bounded on the N. by Switzerland, on the W. by France, and on the S. and E. by Piedmont (q.v.). It is crossed by the beautiful V. itself, running SE. from Mont Blanc (q.v.) between the Pennine and the Graian Alps (qq.v.); the valley is watered by the Dora Baltea, a trib. of the Po (q.v.). There are passes into Switzerland and France (see ST BERNARD), and on the NE. boundary is the Matterhorn (q.v.). The region has a local autonomy, and is largely Fr. speaking. Agriculture is the main occupation, there are extensive mineral deposits, and there are hydro-electric plants. The cap. is Aosta (q.v.). Area 1259 sq. m.; pop. 97,000.

Valle-Inclán, Ramón María del (1869-1936), Sp. poet, novelist, and dramatist, b. Caramiñal. He first attracted attention by his book of poems *Aromas de Leyenda*, 1906, in which he sang the life of the common people. There were in the poems an earthy strain redolent of the soil and at the same time an exquisite refinement more like that of the Fr. decadents. His most celebrated prose piece is his four *Sonatas*, 1902-5, dealing with 4 love-affairs in the career of his hero Xavier de Bradomín, who is V.-I.'s conception of Don Juan. His *Flor de Santidad*, 1904, is a story of Galician peasants, and more realistic in setting. His verse plays, as *Cuento de Abril*, 1910, are delightful; his prose plays, really novels in dramatic form, such as

the *Comedias Bárbaras*, the *Esperpentos*, and *Parasas*, are written in a style of extraordinary vigour and violence. Eccentric in his character and life, he is one of the most independent, stimulating, and exciting of Sp. writers. See M. Fernández Almagro, *Vida y literatura de Valle-Inclán*, 1944; R. Gómez de la Serna, *Don R. M. del Valle-Inclán*, 1944.

Vallejo, city of Solano co., California, U.S.A., on San Pablo Bay (NE.), 30 m. NE. of San Francisco. It has shipyards and iron foundries, while Mare Is. opposite is one of the H.Q.s of the U.S. Pacific Naval Squadron, with a navy yard, arsenal, dry docks, and a lighthouse. V. is a processing and commercial centre, with flour and lumber milling, meat packing, and dairying. Pop. 26,000.

Valletta, Valetta, or **La Valetta**, cap. of Malta (q.v.), situated on the SE. coast of the is., on a rocky peninsula, Mt Sciebberras (1½ m. long, ½ m. wide), which separates Marsamuscetto Harbour (on the W.) from the Grand Harbour (on the E.). It is an important port of call, and is the base of the Brit. Fleet in the Mediterranean. It was founded by Jean Parisot de la Valette, Grand Master of the Knights of Malta (see HOSPITALIERS, KNIGHTS), after the unsuccessful Turkish siege of 1565. It was taken by Napoleon in 1798, but afterwards revolted and was taken by the British in 1800. It was severely bombed by Axis planes during the Second World War. The It. fleet surrendered here in Sept. 1943. The main street of V. runs along the peninsula to the fort and lighthouse of St Elmo. Apart from the prin. thoroughfares, the streets of the tn are steep and narrow. There are many fine buildings, notably the former palace of the Grand Masters (now the governor's residence), the cathedral of St John (1576), which contains some beautiful pictures and tapestries, and the *auberges* (lodges built for members of different nationalities) of the Knights of Malta. Of the *auberges*, the finest is the Auberge de Castille. There is a univ. (1769) and a library containing the archives of the Knights. Pop. 19,100.

Valley. The name given to an elongated depression bounded by higher ground on either side and at the upper end. With few exceptions V.s result from erosion by running water or flowing ice (see RIVER; GLACIERS). Certain V.s, of which the Rift V.s (see below) are most prominent examples, result from fractures in the crust of the earth formed by faulting (q.v.).

Riv. V.s develop through the downward erosion of the stream which tends to deepen the V., and the weathering and collapse of the sides which tends to widen the V. The profile of the V.s results from the interaction of these 2 processes, and is further complicated by variations in the nature of the underlying rock. V.s cut by rapidly down-cutting streams have steeply inclined slopes converging on the water-course itself; a V-shaped cross-section is produced and there is little flat ground in the V. bottom. Such V.s are common in mountainous regions. Particularly steep-

sided gorges result if mt building causes uplift of the V. floor, but is not so marked as to stop the stream. The Arun, for example, has cut a gorge 10,000 ft deep through the rising Himalaya, which it crosses from N. to S. In flatter country V.s are wider and have broad alluvial flats, particularly where the riv. course migrates across the V. bottom in the course of time. Such an arrangement, often accompanied by meanders in the riv., occurs in mature slowly flowing stretches of its course.

Glaciers may move down pre-existing V.s and modify their shape through erosion. The main effects to be expected are the truncation of spurs, the steepening of the V. sides, the widening of the V.

A rather similar fault structure, consisting of uplifted blocks or horsts flanking a sunken block or graben, forms the Rhine V. in W. Germany and the Oslo fjord dist. in Norway.

Many fjords, however, owe their present shape to over-deepening by the passage of ice which has scoured out their base well below sea-level (see FJORD).

Solution V.s occur where underground material has been removed by solution through the passage of ground water. They are usually found in limestone country.

V.s are important to man as natural communications, as fertile readily cultivated ground, and consequently as the homes of civilisation.



Royal Swedish Embassy

VÄLLINGBY, STOCKHOLM'S NEW SATELLITE TOWN

bottom, and the straitening of minor irregularities. A characteristic U-shaped profile is developed by glacial erosion. Tributary V.s may debouch high up on the steepened walls of the major V., giving rise to spectacular waterfalls. Such V.s are termed hanging V.s.

The Rift V. system is one of the major features of the crust of the earth, and extends from the Zambezi V. of S. Africa to the Dead Sea and the Jordan V. It results from a great system of fractures in the crust of Africa and of the uplift of the land on either flank. This has had the effect of leaving a narrow sunken block usually some tens of m. in width bounded at each side by steep faults (q.v.), beyond which lie the uplifted ground. Many of the major African lakes, such as Lake Nyasa, Lake Tanganyika, and Lake Kivu, occupy Rift V.s. Extensive outpourings of lava accompanied their formation, particularly in Kenya and Ethiopia.

The Red Sea occupies a V. of this system, and the Dead Sea is a saline inland sea formed by the evaporation of riv. water unable to escape to the open sea.

Valley of Ten Thousand Smokes, volcanic valley of 72 sq. m. in the Katmai dist. of Alaska. Mt Katmai blew up on 6 June 1912, causing total darkness for 3 days, and depositing 10 in. depth of ash 100 m. away. Shortly before the eruption the valley burst in many places and threw out masses of molten material. These fissures have continued to discharge hot gases, and it is from this peculiarity that the valley has received its name. President Wilson proclaimed the dist. a National Monument in 1918. See R. F. Griggs, *The Valley of Ten Thousand Smokes*, 1922.

Valleyfield, city of Quebec, Canada, on the R. St Lawrence, at the upper end of Beauharnois Canal. There are cotton, woollen, flour, and saw mills, distilleries, etc. Pop. 23,500.

Vällingby, a new satellite tn to Stockholm (q.v.), Sweden. The tn grew up in about 3 years. It is a garden city, situated 10 m. W. of the cap. and houses about 25,000 people, a good proportion of whom derive their living from work within the city of Stockholm.

Vallombrosa, It. monastery, in Tuscany (q.v.), standing in the birch forest of V. in the foothills of the Apennines (q.v.), 13 m. ESE. of Florence. It was founded by St John Gualbert (c. 1038) as the first house of an independent Benedictine (q.v.) congregation, the *Vallombrosans*, but the present building dates from the 17th cent. The monastery was suppressed, and the buildings became a school of forestry after 1869. V. is mentioned by Ariosto (*Orlando Furioso*) and Milton (*Paradise Lost*).

Valmy, vil. in the dept of Marne, France, 6 m. from Ste Menehould. A pyramid (1819) on a hill in the S. commemorates the victory of the Fr. Revolutionists under Kellermann and Dumouriez over the Prussians (1792), a turning-point in the fortunes of the new rep. Pop. 400.

Valois, Charles de, see ANGOULÊME.

Valois, House of, Fr. dynasty, ruling 1328-1589, and beginning with Philip VI (1328-50). On the death of Charles VIII without sons (1498) the crown passed to Louis of Orleans (XII), the first of the Valois-Orleans house. This was succeeded by the Valois-Angoulême branch in 1515, the V. line finally dying out with Henry III, in 1589, when the Bourbons came to the Fr. throne. See G. Dodu, *Les Valois: Histoire d'une maison royale*, 1328-1589, 1934.

Valona, see AVLONA.

Valor Ecclesiasticus, see LIBER REGIS.

Valparaiso: 1. Prov. of Chile, the smallest but most thickly populated. The prin. occupations are centred on agriculture, cattle raising, and fisheries. Area 1860 sq. m.; pop. (1952) 498,186.

2. Cap. of the above, and the prin. port and commercial centre on the W. coast of S. America, 116 m. NW. of Santiago by rail. Copper, wheat, silver, and nitrates are amongst the exports. It lies upon a broad, open, semicircular bay, on the slope of a spur of barren hills forming a rocky peninsula whose promontory affords good shelter from westerly and southerly storms. Costly improvements of recent times, including a sheltering mole, have made the port a more desirable haven from N. gales.

V. was captured in 1578 by Drake, and in 1596 by Hawkins, and in 1600 was sacked by van Noort. In 1866 it was bombarded by the Sp. fleet and devastated, and in 1891 was sacked by the Chileans themselves after the repulse of Balmaceda. It suffered greatly from earthquakes in 1730, 1822, 1839, 1873, while in 1908 it was almost entirely destroyed. But the city was soon rebuilt, with architectural improvements. Not many antiquities have survived the earthquakes or other disasters (though a small part of the old colonial town exists in the hollow known as 'The Port'), and the palaces, churches, villas, and fortifications are modern. Until recently all buildings were low, as a precaution against earthquakes. Of some architectural interest are the Intendencia, or H.Q. of the prov. gov., the cathedral, the huge Naval Academy, and the Univ. of Engineering. V. has machine and railway workshops;

the local products include textiles, sugar, petrol, paints, varnishes and enamels, shoes, chemicals, leather, pharmaceutical goods, and cottonseed oil. Pop. 218,329.

3. City, co. seat of Porter co., Indiana, U.S.A., in dairy, poultry area 40 m. SE. of Chicago. It manufs. magnets, farm implements, ball and roller bearings, etc., and is the seat of V. Univ. Pop. 12,000.

Valtellina, the valley of the upper Adda (q.v.), in Lombardy (q.v.), Italy, stretching from the Ortler Group of the Alps to Lake Como. It is well known for its wine, and it produces also figs, mulberries, and wheat. The chief tn is Sondrio (q.v.).

Valuation, see APPRAISEMENT; DOMESDAY BOOK; TAXATION; RATING.

Value, in economics, means V. in exchange. The V. of an article is expressed in terms of the article for which it exchanges, price being the V. of an article in terms of money. According to the 'Labour Theory' of V., developed and popularised by Karl Marx, all V. is the creation of labour; but the 'Cost of Production' theory widens the conception to include all the factors of production. Even so, the theory deals only with the side of supply and ignores (utility and) demand. According to the 'Marginal Theory' of V., however, which combines the two sides, exchanges tend to equate marginal cost and marginal utility. Utility is subjective; there is no truth in the view that if one party benefits from an exchange the other must lose, provided the exchange is freely entered into.

Valuyev, Pëtr Aleksandrovich, Count (1814-90), Russian statesman. He was minister of the interior 1861-8, chairman of the committee of ministers 1877-81, and played an important part in the Great Reforms (q.v.), particularly in the estab. of the Zemstvo (q.v.). In 1863 V. put forward a constitutional project which provided for a consultative assembly of partly elected, partly appointed members. This project was again taken up in 1880, but was not implemented. See also ALEXANDER II; LORIS-MELIKOV.

Valves, the two parts into which the pericarp of pods splits open along defined lines to liberate the seeds.

Valves, Mechanical, are devices for controlling the movement of fluids in pipes and conduits or their escape from containers. They may be operated by the flow or pressure of the fluid itself, by the engine of which they form a part, or independently by hand. V. operated by the fluid at low pressure and at appreciable time intervals, as in the ordinary hand pump, may consist of a simple flap hinged at a point of the pipe wall—at the top if the pipe is horizontal—swinging out in the direction of flow and closing on to a seat against flow in the opposite direction, or the flap may be hinged on a diametrical axis, as in the butterfly V. In the case of vertical flow the poppet V. is used. Shaped like a mushroom, it rests with its flat base on the V. seating and its stem in the pipe; it lifts bodily from its seating, and some form of guide is arranged to ensure true working. To limit the lift of the V. a metal or rubber

stop may be provided, or the motion may be controlled by a suitably adjusted spring. Such V. are suitable for higher speeds and pressures, which would rapidly throw a hinge out of action. There is, however, the difficulty of shock to be met, partly by reduction of weight of moving parts, partly by reduction of the area of contact, and partly by reduction of the lift. By providing a double seating, as in the *double-beat V.*, half the lift only is required. *Four-beat V.* are used for powerful engines in extension of this principle. Poppet V. are used in internal-combustion engines, and especially in the ordinary motor-car petrol engine, where they are usually operated by a cam shaft, admitting and exhausting fuel to and from the cylinder. In the Diesel engine (q.v.) a needle V. is used for introducing the oil as a spray into the cylinder. The moving part is a tapering needle, which allows of fine adjustment. In the Pulsometer (see PUMPS) and other high-speed engines a ball is used as a V. For air pumps, V. of rubber are generally used. To avoid the evils of varying boiler pressure, reducing V. are employed. There are sev. kinds of reducing V., but their modes of action are the same. The entering steam passes by the V. closed by a spring to the main throttle V., which it lifts and then acts on the piston.

Safety Valves are attached to boilers or other vessels where the fluid contents may reach a pressure great enough to cause bursting. The *deadweight safety V.* has a spherical V. fixed to a cover piece which can be loaded with weights. These are adjusted so that the V., the shape of which prevents sticking, will lift if pressure through the pipe becomes too great. There is good stability owing to the low centre of gravity. The *lever safety V.* has a conical V., the pressure on which is adjustable by means of a weight acting at the end of a lever. The moment steam escapes, its lifting force varies in a manner differing with the shape of the V. and opening; usually the lift required to keep the passage open is greater than that required to open it, and it would be better if load diminished with opening. The use of springs intensifies this difficulty. In marine safety V. 2 or 3 are placed on the same V. box so as to produce more opening for the lift. Long springs are used and so adjusted that an opening of not more than $\frac{1}{4}$ in. will be necessary, thus reducing the increased load. On locomotives springs are universal, the 'Ramsbottom' being very largely used. Both V. are operated simultaneously by the spring acting on the lever. The fulcrum by its position ensures the lessening of the load if the V. lifts. The extension of the lever provides a means whereby the engine-driver may test either V. for sticking or obstruction. The 'Naylor' contrivance is largely used for spring safety V. The V. is pressed on its seat by means of a spring acting through a bent lever so arranged that the opening of the V. and pressure on the spring alter the leverage, thus not

increasing the load. The *low-water safety V.* used on stationary engines is loaded directly by a spindle with a weight, but negatively by a weight acted on by a float through a lever. If water is too low the float increases in weight and reduces the load on the V. so that steam blows off. There are various ways of arranging that a V. shall not close until pressure is sufficiently relieved; one of the simplest is by shaping the periphery of the V. so that it forms a lip overhanging the orifice; the steam acting on this lengthens the period of lift. In steam engines (q.v.) the V. controlling admission of steam to the cylinder and exhaust are operated by the engine, as the timing is an essential factor. A number of different designs have been produced, and efficient V. gear is of prime importance for efficient working. Hand-operated V. are used for controlling flow in water-supply systems. See E. L. Ahrons, *Steam Engine Valves and Valve Gears*, 1921; P. Nougsson, *Slide Valves and Valve Gearing*, 1927.

Valves, or Vacuum Tubes. The first valve, invented (1904) by Fleming (see RADIOCOMMUNICATION), consisted of a vacuum bulb with a heated filament (cathode) surrounded by a cylinder. Electrons were emitted from the filament to the cylinder when this was given a positive potential (anode)—in conventional terms, 'current' flowed from the anode to the filament. No current flowed if the cylinder was negatively charged. On a.c. this 'diode' acted as a half-wave rectifier (q.v.), barring the negative part of the wave if applied to the anode. Using 2 diodes or a diode with 2 filaments, full-wave rectification is obtained (see Fig. 1).

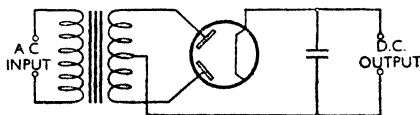


FIG. 1. FULL-WAVE RECTIFIER

In modern diodes the filament is sometimes surrounded by a cathode consisting of a small metal tube coated with a substance rich in electrons which is heated by the filament, and surrounding the whole is the anode. In a normal radio set the diode provides the high d.c. voltage supply for the other valve anodes. In a slightly different form it is used for the rectification of radio frequency signals, and as such becomes a de-modulator or detector. The output is a series of d.c. pulses corresponding to the positive half-cycles, and is proportional to the a.c. voltage at its input. Fig. 2 represents the basic circuit for a radio frequency detector. Lee de Forest (1907) added a third electrode, the 'grid,' making the diode into a triode. Small variations in grid voltage were found to produce large variations in anode current, which, of course, can be trans. into output voltage by a resistance in the output circuit.

Thus a weak 'signal' fed to the grid is 'amplified.' The amplification process may be followed by detection. Under certain conditions a pair of V. may be operated as an amplifier using the non-linear parts of the valve curve. The normal method is called class A, while the latter is referred to as push-pull

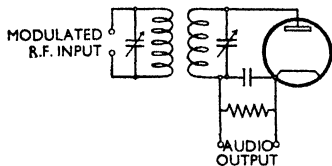


FIG. 2. BASIC DIODE DETECTOR CIRCUIT

class AB or class B. The two last named are used when large outputs are required. A basic valve amplifier circuit is shown in Fig. 3. The valve has found numerous applications, further extended by the addition of more grids, in pentodes, heptodes, etc., and the use of cavity resonators (q.v.). The functions of these V. are studied by means of the 'characteristics,' graphs from which the behaviour

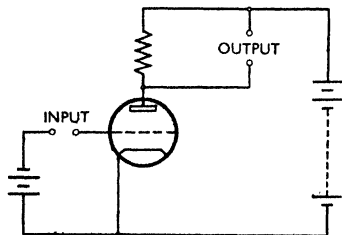


FIG. 3. BASIC VALVE AMPLIFIER CIRCUIT

of the valve under different conditions can be studied. The characteristics of the triode are: the anode current I_a as function of grid voltage V_g , 'mutual conductance', g_m , or the 'slope'; anode current as function of anode voltage V_a ; this is different for different grid voltages; the inverse value is the 'a.c. resistance', r_a ; the grid current as function of grid voltage, for different anode voltages. The characteristics mostly consist of a straight portion (constant-position slope), with decreasing slope at higher values. The coefficients are therefore expressed as differentials: $g_m = \left(\frac{\partial I_a}{\partial V_g} \right) V_a$, $r_a = \left(\frac{\partial V_a}{\partial I_a} \right) V_g$.

The amplification factor $m = r_a \times g_m$. The characteristics are determined by the geometry of the design. A high amplification factor requires a closely meshed grid and a distance from cathode to anode much greater than the distance from cathode to grid. For the ordinary radio frequency detector, r_a is 20,000–50,000 ohms, the amplification factor is 15–50, and $g_m = 0.7$ – 0.15 mA/V. The amplifier

has $r_a = 4000$ – $12,000$ ohms, amplification factor 10–30, $g_m = 0.9$ – 1.8 mA/V. An output valve may have $r_a = 1000$ – 4000 ohms, 2–10 amplification factor, $g_m = 2$ – 4 mA/V.

The Magnetron is a cavity resonator device used at centimetric wavelengths in Radar (q.v.) applications. The Klystron is also associated with centimetric wavelengths, and its power capacity is more limited than that of the Magnetron. Its main application is in the local oscillator circuits of receivers for use on such wavelengths. The Skiatron is very similar in action to the cathode-ray tube, but, unlike the latter, which produces a lighted trace on the tube screen, presents the phenomena to be examined as a dark trace on the tube face. It is thus very suitable for the display of navigational radar information. See ELECTRONIC COMPUTATION; ELECTRONICS; MECHANICAL DIFFERENTIAL ANALYSER; OSCILLATORS; RECTIFIERS; RADIOCOMMUNICATION; RADAR; TELEVISION; THYRATRON. See also A. J. Starr, *Radar and Radar Technique*, 1952.

Vampire, monster which figures largely in the superstitions of Russia, Serbia, and Poland, and which, with modifications, pervades the folklore of many peoples. It is primarily the spirit of a dead man, which, leaving the grave by night, sucks the lifeblood of sleepers till they waste away and die. See also DEMONOLOGY.

Vampire Bats, which are true blood-suckers, are found in S. America, and belong to the genus *Desmodus* of the order *Chiroptera*. They are small creatures, and suck the blood of man, cattle, and horses. The bats which are found in the genus *Vampyrus* feed on fruit and insects, and have no share in the dietary of *Desmodus*.

Van. 1. Il. of E. Turkey, in the neighbourhood of the V. lake. Pop. 176,203.

2. Cap of the above, on the E. shore of Lake Van. V. has a considerable trade in corn and rice, and manufs. cotton goods. The tn is prosperous and has good cafés, schools, and bazaars. It is supposed to have been a place of residence of Semiramis. There are many antiquities and cuneiform inscriptions of the kings of Ararat. V. is on the site of Thospia, cap. of the ant kingdom of Blaina. Pop (1950) 13,471.

Vanadium, metallic chemical element, symbol V, atomic weight 51.0, atomic number 23, found in the minerals vanadinite (lead vanadate), pucherite (bismuth vanadate), mottramite (lead-copper vanadate), carnotite (potassium uranyl vanadate), and patronite (impure sulphide). The element is prepared by heating the dichloride in a stream of pure hydrogen. It is a greyish metal with a high melting point (about 1710° C.) and is used in making hard steels. V. forms 5 oxides, corresponding to the oxides of nitrogen, and 3 chlorides. The pentoxide, formed by burning the metal in air, gives rise to the vanadates. Many V. compounds find application in industry; thus the pentoxide is used as a catalyst in the manuf. of sulphuric acid, and in the oxida-

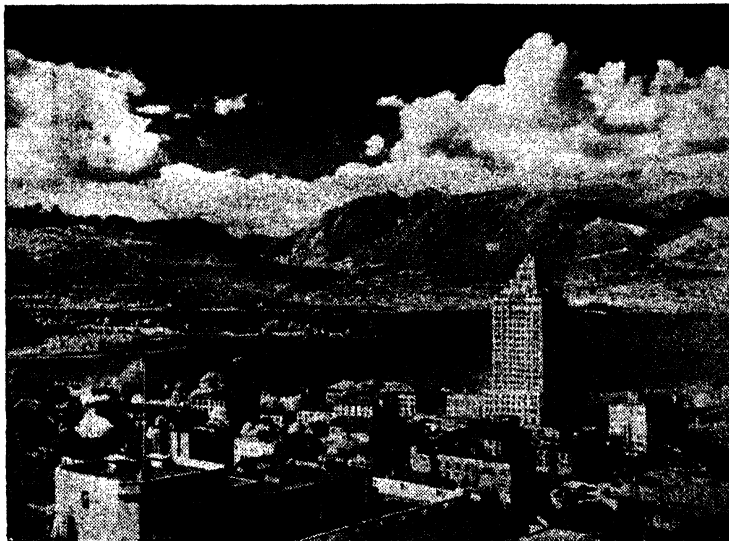
tion of naphthalene to phthalic anhydride, while ammonium vanadate is employed in dyeing leather, etc.

Vanadium Steel, see IRON AND STEEL.

Van Alstyne, Frances Jane, see CROSBY.

Van Beers, Jan (1821-88), Flem. poet, b. Antwerp. He taught Dutch language and literature in Malines, in Lierre, and from 1860 at the Athenaeum in Antwerp. There is great warmth, vigour, and narrative skill in his songs and ballads, the chief of which are *Jongelingsdroomen*, 1853, *Levensbeelden*, 1858, and *Rijzende Blaren*, 1883.

Vanbrugh, Sir John (1664-1726), dramatist and architect, b. London, was controller of the Board of Works 1702-13. Although entirely untrained as an architect, he designed the huge mansions of Castle Howard (1699-1726), Blenheim (1705-20), Seaton Delaval (c. 1720), and many others; also much of Greenwich Hospital. He was one of the few Eng. architects to follow the Baroque style. As early as 1696, his first play, *The Relapse*, was produced; and this was followed by sev. others, including *The Provoked Wife*, 1697, *The False Friend*



National Film Board, Canada

VANCOUVER

Looking to the north-west from the Hotel Vancouver: an infra-red photograph.

Vanbrugh, Dame Irene and Violet, actresses, daughters of Prebendary R. H. Barnes of Exeter. *Irene V.* (Mrs. Dion Bouicault) (1872-1949) began her stage career at the Theatre Royal, Margate, in the rôle of Phoebe in *As You Like It*. Among her numerous parts were Rosalind in Barrie's play of that name, Agnes Ebb-smith in Pinero's *The Notorious Mrs Ebb-smith*, also Paula in the same dramatist's *The Second Mrs Tanqueray*, and Nina in *His House in Order*. See her autobiography *To Tell My Story*, 1948.

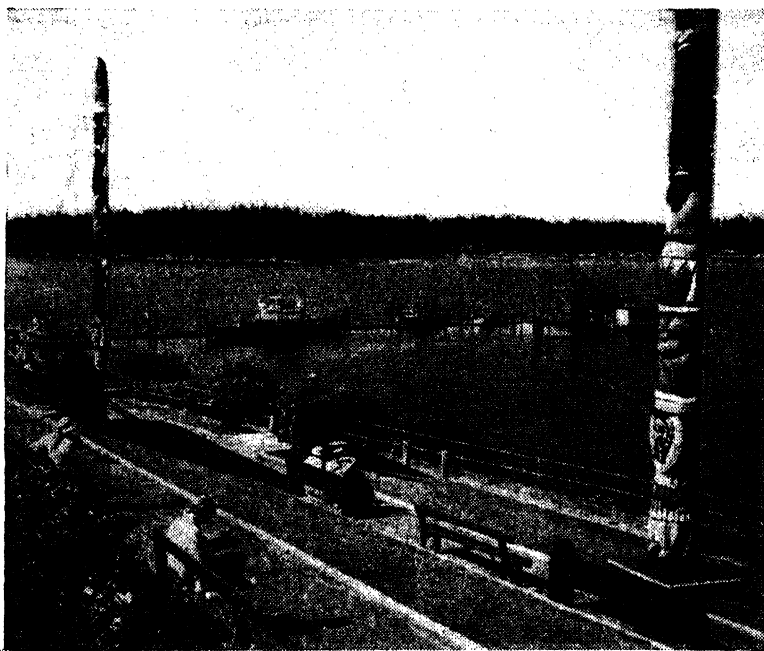
Violet V. (1867-1942) was also distinguished, among her many rôles being Queen Katharine in an all-star revival of *Henry VIII*, and Lady Carfax in *The Knave of Diamonds*. By the command of King Edward VII, she played Portia in *The Merchant of Venice* at Windsor Castle (1905). She also appeared in films, notably *Pygmalion*, 1938.

1702, and *The Confederacy*, 1705. His plays are distinguished by their wit and skill of situation, and he was a master of satire, which he used with great effect against the Puritans in *The Relapse*. V. was knighted in 1714. An ed. of the *Complete Works* in 4 vols. was pub. in 1927, the dramas ed. by B. Dobrée and the letters by G. Webb. See studies by C. A. Barman, 1924, and L. Whistler, 1938.

Van Buren, Martin (1782-1862), 8th President of the U.S.A., b. Kinderhook, New York, of Dutch descent. He devoted himself from early life to law and politics, and attached himself to the Democratic party, being elected to the U.S. Senate in 1821. He opposed the establishment of the state bank, supported war with England, and advocated the raising of the tariffs and the liberal extension of the franchise. He warmly

supported the candidature of Gen. Jackson for the presidency in 1828, and became successively governor of New York state, secretary of state, and vice-president of the Union, eventually succeeding Jackson as president in 1837. The early days of his presidency were mainly occupied in settling the national finances in order, a task in which he met with only partial success owing to the opposition of Congress.

seaport, on the S. shore of Burrard Inlet. It has a fine harbour, and steamships ply from it to all major world ports. W. terminus of the Canadian Pacific and Canadian National Railways, and N. terminus of the U.S. Great N. and N. Pacific Railways, it has an airport with daily services to prin. cities in Canada and the U.S.A., and weekly services to the Orient, Australia, and New Zealand. The city has many fine buildings and is



British Columbia Government Travel Bureau
TOTEM POLES AT NANAIMO, VANCOUVER ISLAND, B.C.

The country was upset by a financial panic and V. B. pressed his bill for an independent U.S. Treasury, which was finally adopted in 1840. He ran for the presidency in 1840 as a Democrat and in 1848 as Free Soil candidate. *See* life by E. M. Shepard, 1888.

Vancouver, George (1758-98) Brit. navigator, who accompanied Cook on his second (1772-4) and third (1776-80) voyages. In 1791-2 he was engaged in exploring the NW. coast of N. America from 39° 27' N. to 52° 18' N., including the is. which was named after him. A complete account of his voyage appeared in 1798. *See* W. Meany, *Vancouver's Discovery of Puget Sound*, 1907.

Vancouver, commercial metropolis of Brit. Columbia and Canada's chief Pacific

the seat of the univ. of Brit. Columbia. Chief industries: lumbering (of which it is the centre), canning, brewing, sugar refining, saw and flour milling, and shipbuilding. Pop. Greater Vancouver (1956) 658,813.

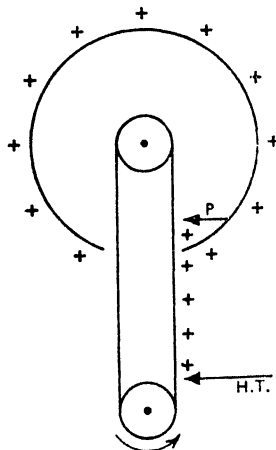
Vancouver, North, city of Brit. Columbia, Canada, opposite the city of Vancouver with which it is connected by the First and Second Narrows Bridge. Although essentially a residential and holiday resort, it has a large lumber assembly dock, and some canning, quarrying, and shipbuilding. It is the S. terminus of the Pacific Great F. Railway. Pop. 19,800; (with dist.) 25,719.

Vancouver Island, is. off the coast of Brit. Columbia, of which it forms part.

It is separated from the mainland by the straits of Juan de Fuca, Haro, Georgia, Johnstone, and by Queen Charlotte Sound. It was first circumnavigated by Capt. George Vancouver (1758-98), a Brit. navigator, in 1792, whence its name. It was estab. as a Crown colony in 1849 under the aegis of the Hudson's Bay Company. In 1866 it was united with the mainland colony of Brit. Columbia (estab. 1858) and the cap. was temporarily located at New Westminster. The is. is 282 m. long and has an area of 12,408 sq. m. with a deeply indented coast-line containing many deep-water harbours. The country on the S. and E. coasts is comparatively level; the interior is mountainous and heavily timbered. Gold, copper, and iron are found, and there are some important coal measures, but the chief wealth is in the forests.

Victoria (q.v.), the cap. of Brit. Columbia, is on S. tip of the is., as is Esquimalt, the naval station 3 m. away. Other tns are Nanaimo, Port Alberni, Duncan, Comox, Cumberland, and Courtenay.

Van de Graaff Machine is an electrostatic machine (q.v.) for the production of high voltages. It consists of a moving



belt of insulating material, one end of which is charged by passing near a point conductor attached to a high-tension supply (H.T. in fig.) at 5000-50,000 volts. The other end of the belt enters an insulated hollow conducting sphere, and the charge on the belt is collected by the pointed conductor (P). The action of the points depends on induction (q.v.), which produces an opposite charge on the points, and in consequence there is locally a high electric field leading to a point discharge. The charge is transferred to the sphere irrespective of the voltage on the sphere; a result of the inverse square law

of charges (see ELECTROSTATICS). The sphere can be charged to about 8,000,000 volts, provided the whole apparatus is enclosed in a tank containing a suitable gas at pressures up to 15 atmospheres and other precautions are taken to prevent sparking, e.g. a very high polish is made on the spheres and all corners rounded to prevent point discharge to the surroundings. The current obtained is small (up to about 50 μ A), but the voltage is very stable, not varying by more than a few thousand volts, and for this reason the generator has many important applications in atomic and nuclear research. See also CYCLOTRON.

Van de Velde, the name of 3 Dutch painters: *Willem the Elder* (c. 1611-93), appointed naval painter to Charles II of England (1667); *Willem the Younger* (1633-1707), son of the above, whom he succeeded as marine painter to Charles II (1679); *Adriaen* (1639-72), animal and landscape painter, son of the first, b. and d. at Amsterdam.

Van der Goes, Hugo, see GOES.

Van der Helst, Bartholomaeus, see HELST.

Van der Meer, Jan, see MEER.

Van der Rohe, Ludwig Mies (1886-), German-Amer. architect, b. Aachen; learned the elements of building from his father, a master-mason, and was then apprenticed to a firm of architect-decorators. In 1905 he went to Berlin, entering the office of Behrens (q.v.) 3 years later. Here he met Gropius (q.v.) and 'Le Corbusier' (q.v.), and remained in this stimulating company till 1912. A year at The Hague followed; then the First World War; and in 1919 he returned to Berlin.

During the next 4 years, besides building some large flats for the city of Berlin, he produced some remarkable designs for skyscrapers, etc., and in 1930 became Director of the Bauhaus at Dessau on the recommendation of Gropius.

In 1937 he went to the U.S.A.; and in 1938 became Director of Architecture at the Illinois Institute of Technology at Chicago, for which he carried out important buildings from 1939 onwards. He also designed 2 very tall blocks of flats on the lake-side at Chicago in 1949 and 1951. See biographies by P. J. Johnson, 1947, 2nd ed. 1953, and by M. Bill, 1955.

Van der Waals, Johann Diderik (1837-1923), Dutch scientist, b. Leyden, celebrated for his researches upon the kinetic theory of gases and upon the continuity of the gaseous and liquid states of matter. His equation

$$\left(P + \frac{a}{V^2}\right)(V - b) = RT$$

represents the actually observed relationship between the pressure, vol., and temp. of a gas much more closely than the simple law $PV = RT$. The constant b is, theoretically, equal to 4 times the real vol. of the molecules of the gas, while a is proportional to the attraction that the molecules exert upon one another.

Van der Weyden, Rogier, see ROGIER.

VAN DER WEYDEN.

Van Diemen, Anthony (d. 1645), Dutch explorer and colonial governor, b. Kullenberg. He went to India as a gov. accountant and in 1625 became a member of the supreme council. In 1631 he returned to Holland in command of the Dutch Indian fleet, and, the following year, was sent back as director-general. Later he became governor-general, in which capacity he greatly extended Dutch interests in the Far E. In 1642 he sent Abel Tasman on a voyage to the S., the result of which was the discovery of the is. which was named after him Van Diemen's Land, but which, at the instance of its Brit. colonists, was changed to Tasmania (q.v.).

Van Diemen's Gulf, between Coburg Peninsula and Cape Hotham and Melville Is., NW. Australia. It is 100 m. long by 60 m. broad.

Van Diemen's Land, see under TASMANIA.

Van Druten, John (1901-57), Amer. playwright and novelist, b. London, educ. University College School. At first he studied for the law, but he achieved fame as a playwright with *Young Woodley*, 1928. Subsequent plays included *After All*, 1929, *There's Always Juliet*, 1931, *Behold, We Live*, 1932, *The Distaff Side*, 1933, *Old Acquaintance*, 1940, *The Voice of the Turtle*, 1943, and *Bell, Book, and Candle*, 1950. He also wrote 2 plays based on works by other authors, *I Remember Mama*, 1944, and *I am a Camera*, 1951 (the latter based on Christopher Isherwood's Berlin stories). Other works included 4 novels, 2 autobiographical books, *The Way to the Present* and *The Widening Circle*, and *Playwright at Work*.

Van Dyck, Sir Anthony (1599-1641), Flem. painter, b. Antwerp, acquired the rudiments of his art from Van Balen. Some early religious paintings were noticed by Rubens, who made him an assistant, and V. D.'s hand can be traced in many works of that master. The Earl of Arundel induced him to visit England. James I gave him a pension, and, soon after, leave to travel to Italy, where he painted many notable portraits and acquired broader aesthetic horizons in studying Titian, Veronese, and Tintoretto. He returned to Antwerp, a rival of Rubens. To this period belong the beautifully modelled etchings made from studies in 'grisaille' of famous painters and others met on his travels in Italy. Once more he visited England (1632). Knighted and made Court painter, he received the patronage of Charles I, who arranged his marriage with Mary, daughter of Sir Patrick Ruthven. Fine portraits of the Royal family come from this time, 2 examples being the king's head from 3 points of view, for the Bernini sculpture, and the large equestrian portrait of the king.

V. D. next embarked on his remarkable record of the Eng. aristocracy. These paintings are scattered throughout the land in the collections of most of the old estab. families. They are not entirely by V. D., who tended to work only on the

painting in the final stage, studio assistants doing the laying-in from V. D.'s careful drawing of head and body and notes on dress, decorations, ornaments, and general composition. He was always able subtly to flatter his sitter, and yet overcome his mannerisms to produce a fine picture if seldom a true revelation of character. V. D. owed little or nothing to Eng. tradition, but he estab. a formula for the grand style in portraiture which was to be accepted for generations. See *Lives and studies* by L. Cust, 1900; M. Rooses, 1902; H. Stokes, 1905; E. Schaeffe, 1909; E. V. Lucas, 1926.

Van Eeden, Frederik Willem, see EEDEN.

Van Eyck, see EYCK.

Van Gogh, Vincent, see GOGH.

Van Leeuwenhoek, Anthony, see LEEUWENHOEK.

Van Lennep, Jacob, see LENNEP.

Van Lerberghe, Charles (1861-1907), Belgian poet, b. Ghent. He was educ. at the famous Collège de Sainte Barbo in Ghent. He won a large measure of fame with his best book, *La Chanson d'Eve*, 1904. His poetry is sensitive and beautiful, but the mystical symbolism makes much of its thought difficult to follow. See L. Christophe, C. Van Lerberghe, 1943.

Van Marnix, Philip de Sainte Aldegonde, see SAINTE ALDEGONDE.

Van Meegeren, Henricus Anthonius (Han) (1889-1947), Dutch painter and forger, b. Deventer. He made 8 fakes of 17th-cent. masters, including 'Christ at Emmaus,' a supposed Vermeer, which long imposed on the world.

Van Veen, Maerten, see HEEMSKERK, MAERTEN JACOBSZ.

Van Wyksvlei, see CARNARVON.

Vandals, The, Teutonic people of E. Germanic stock, originally inhabiting the area between the Vistula and the Oder. In the days of Aurelian (271) there was a Vandal wing to the imperial army, and the famous Stilicho was Vandal by descent. Under Constantine I (330) they made a home in Pannonia, many adopting the Arian Christianity which Wulfilas had taught. About 406 they began to swarm into Gaul, across the Pyrenees to Spain, where, after much bloodshed, they settled down with the Alans in Andalusia ('Vandalitia'). Genseric (q.v.) the V. king invaded Africa in 429. He captured Hippo (431) and Carthage (433) and was soon acknowledged master of the whole prov. In 455 he sacked Rome; and his pirate bands terrorised the Mediterranean. The V. decline began after Genseric's death in 477. In 534 Gellimer (q.v.), having suffered defeat at the hands of Justinian's gen. Belisarius, both at Ad Decimum and Tricamarum, finally acknowledged the supremacy of Rome, and thus brought to an abrupt conclusion the independent hist. of his tribe. See L. Schmidt, *Geschichte der Vandalen*, 1901; F. Lot, *La fin du monde antique*, 1927.

Vandenberg, Arthur Hendrick (1884-1951), Amer. statesman, b. Grand Rapids, Michigan. He entered the Senate as a Republican in 1928. He gradually changed from a narrow nationalist

approach or isolationist outlook to a strong belief in international conciliation and a modified Amer. participation in the world structure. He became the Republican party's chief spokesman in foreign affairs. After the Second World War V. was a leading delegate to the U.N. Conference at San Francisco, the Foreign Ministers' Conference in Paris, and he worked staunchly for U.N.R.R.A. He also was of great influence in the development of a bipartisan foreign policy.

Vanderbilt, Cornelius (1794-1877), Amer. financier, b. Port Richmond, Staten Island (now part of New York City). Descended from Dutch ancestors exiled by religious persecution, at 16 he bought a boat and started a ferry, which he gradually developed into a large steamboat business round New York. In 1863 he started speculating in railways, acquiring enormous and commanding interests, and left a fortune of over £20m. By his will the Vanderbilt Univ. was founded. His eldest son Wm Henry V (1821-85) joined him in business, acquiring further extensive railway control, and also left an immense fortune. See G. Myers, *History of the Great American Fortunes*, 1908-10; A. D. H. Smith, *Commodore Vanderbilt*, 1927.

Vanderbilt University, non-sectarian institution of higher learning for men and women at Nashville, Tennessee, founded in 1873. It comprises a college of arts and sciences and schools of engineering, law, religion, medicine, and nursing; and the average enrolment of students is about 3500. The total book resources in 1955 were 466,518 vols.

Vanderdecken, see FLYING DUTCHMAN.
Van Dine, S. S., pseudonym of Willard Huntington Wright (1888-1939), Amer. writer of detective stories, b. Charlottesville, Virginia. Educ. at Harvard, Munich, and Paris, from 1907 to 1914 he was literary critic for various papers. After the failure of a serious novel, *The Man of Promise*, he turned to detective fiction, using an old family name with the initials for 'steam ship.' Under this pen name *The Benson Murder Case*, 1926, was an immediate success, and *The Canary Murder Case*, which followed in the same year, was even more popular. Philo Vance, the languid hero of these books, in part reflected the personality of the author. The last of the crime mysteries, which all used the same formula for their titles, was *The Winter Murder Case*, 1939. See also DETECTIVE STORY.

Van Doren, Carl Clinton (1885-1950), Amer. critic and biographer, b. Hope, Illinois. He was educ. at the univ. of Illinois and at Columbia, where from 1911 to 1930 he was on the Eng. staff. From 1917 to 1921 he was general editor of the *Cambridge History of American Literature*. Said to be America's most popular biographer, he wrote lives of Thomas Love Peacock, 1911, James Branch Cabell, 1925, Dean Swift, 1930, Sinclair Lewis, 1933, and Benjamin Franklin, 1938, this last being awarded the Pulitzer Prize. His critical works include *The American Novel*, 1921, and *American and British*

Literature Since 1890, 1925, in which he collaborated with his brother Mark (q.v.). In 1947 he pub. an ed. of Benjamin Franklin's *Letters and Papers*. *Three Worlds*, 1936, is an autobiography.

Van Doren, Mark Albert (1894-), Amer. poet and critic, b. Hope, Illinois, younger brother of the above. He was educ. at the univ. of Illinois and Columbia, where he became prof. of English, and in 1924 he succeeded his brother as literary editor of the *Nation*. In 1940 he was awarded the Pulitzer Prize for his *Collected Poems*; later vols. are *The Seven Sleepers*, 1944, *The Country Year*, 1946, and *Spring Birth*, 1953. He also ed. *The Oxford Book of American Prose* and *An Anthology of World Poetry*. Among his critical works are studies of Thoreau, 1916, Dryden, 1920, Shakespeare, 1939, and Hawthorne, 1949, and he collaborated with his brother in *American and British Literature Since 1890*, 1925.

Vanduaara, see PAISLEY.

Vane, Sir Henry (the Elder, 1589-1655), statesman, studied at Brasenose College, Oxford, was knighted in 1611, and from the next year held various posts in the royal household. He entered Parliament in 1614, and was employed on various missions and commissions. In 1640 he was made a secretary of state, but after his part in the condemnation of Strafford he was dismissed from this and his other offices in 1641 and joined the parl. party.

Vane, Sir Henry (the Younger, 1613-62), Eng. statesman, the eldest son of Sir Henry V. the Elder, b. probably at Debden, near Newport, Essex. He was educ. at Magdalen Hall, Oxford. After spending 2 years in America, where he was governor of Massachusetts (1636-7), he entered Parliament in 1640, in which year he was knighted. In 1641 he was, for his share in the impeachment of Strafford, dismissed from the treasurership of the Navy. He then joined the parl. party, and they appointed him to his old post, which he held until 1650. He took an active share in the negotiations with Scotland, and in 1648 was one of the commissioners who treated with Charles I at Newport, but he refused to take part in the king's trial. In the early years of the Commonwealth he was one of the leading spirits, but in 1653 he quarrelled on a political matter with Cromwell, by whom 3 years later he was imprisoned for a pamphlet against the Protector's arbitrary methods. After the Restoration, he was tried for high treason and executed on Tower Hill. V. was not a regicide, but his spirited defence against the charges brought against him made the Crown decide that he was 'too dangerous to let live.' He was one of the noblest of the Eng. Puritans, and was a leading champion of religious toleration. See life by J. Willcock, 1913.

Vane, Henry Vane Sutton (1888-), Brit. playwright. He began as an actor, but after writing two plays of no special note scored a signal success with *Outward Bound*, 1923. Later plays were *Time, Gentlemen, Please* and *Marine Parade*.

Vane-Tempest-Stewart, see LONDON-DERRY, SEVENTH MARQUESS OF.

Vänern, largest lake of Sweden, 87 m. long and 44 m. broad. It is very indented, and receives sev. rivs. Its shores are high and rocky in the N., open and shallow in the S., and are fringed by sev. is.

'Vanguard' Brit. battleship, see NAVY AND NAVIES.

Vanilla, genus of climbing orchids, natives of tropical Asia and America, with fleshy leaves and large white and yellow flowers. The V. of commerce is an aromatic used in the flavouring of confectionery and food. It is derived from the long dried pods of *V. planifolia*, which is extensively cultivated in tropical countries.

Vanini, Lucilio (1585-1619), It. free-thinker, b. Taurisano, wrote under the pseudonym of *Giulio Cesare*. He studied at Naples and Padua and was inflamed with the 'New Learning.' He was ordained priest, but soon embarked on a wandering life, preaching a modern anti-religious philosophy. Arrested (1618) on a charge of atheism, he was tortured and burned at the stake. His writings include *Amphitheatrum Aeternae Providentiae Divino-Magicum*, 1516, and *De Admirandis Naturae Arcanis*, 1616.

'Vanity Fair': 1. Political and social review founded in 1868, and in its earliest years the foremost 'society' paper of the day. The series of pencil caricatures of men of public note by Pellegrini, and, later, the chromolithographic caricatures, especially of legal celebrities, by the inimitable 'Spy,' were outstanding features. In 1929 the paper was incorporated in the Eng. ed. of *Harper's Bazaar*.

2. Women's monthly fashion and beauty magazine, founded in 1950 and designed to appeal to 'the younger, smarter woman.'

Vannes, seaport and cap. of the dept of Morbihan, France. It is the seat of a bishopric, and has a school for officers and N.C.O.s of the Reserve. There are agric., shipbuilding, woollen, and rope industries. As Veneti it was the cap. of Isle de Celts. Pop. 28,200.

Vannin, see MAN, ISLE OF.

Vannucci, see PERUGINO.

Vansittart, Robert Gilbert Vansittart, first Baron of Denham (1881-1957), Brit. diplomat and publicist, b. Farnham, and educ. at Eton. He entered the Foreign Office and was secretary to Curzon, then foreign minister, from 1920 to 1924. He was chief diplomatic adviser to the Foreign Secretary from 1938 to 1941. V. was knighted in 1929 and made a peer in 1941. He circulated the views that the Germans were responsible, in large measure, for aggressive wars over a large period of time, tracing the Ger. predilection for aggression back to the time of Tacitus. After the Second World War he advocated strong measures to combat Communism. His main publications include his memoirs, *Lessons of My Life*, 1945.

Van't Hoff, Jakobus Hendrikus (1852-1911), Dutch chemist, b. Rotterdam;

studied anatomy, chem., and mineralogy in Holland, France, and Germany, and in 1878 was appointed prof. of chem. at Amsterdam. In 1896 he became prof. to the Academy of Sciences at Berlin. His great work in conjunction with Le Bel (q.v.) was in connection with stereochemistry. Taking up the discoveries of Wislicenus in connection with the lactic acids, he enunciated in 1874 his discovery that 'in carbon compounds which exhibit the property of rotating the polarised ray in either direction, the molecule in every case contains at least one atom of carbon combined in four different ways' (Tilden), and, later, taking up Kekulé's doctrine of the linking of atoms, he worked it out with great success. In 1894 he pub. a paper which threw much light on the perplexed subject of solutions in electrochemistry. In 1901 he received the Nobel prize for chem. See E. Cohen, *Jacobus Henricus van't Hoff: Sein Leben und Wirken*, 1912.

Vanua Levu, see FIJI.

Vanzetti, Sacco and, Case of, one of the most famous cases in the court annals of the U.S.A., grew out of the murder, on 15 April 1920 of the paymaster and a guard of a shoe-factory at S. Braintree, Massachusetts, and the theft of the money. In May two It. immigrants, Nicola Sacco, a shoemaker, and Bartolomeo Vanzetti, a fish-peddler, were arrested and charged with the crime. On 31 May 1921 they were tried by Judge Webster Thayer and a jury, and on 14 July were found guilty.

At that time there was a widespread intolerance of radical political opinions, and it was claimed by the defence that the accused did not have a fair trial owing to this feeling. Motion for a new trial was based upon the claim that the identification of the men was not complete. This was refused, as were other motions for new trials. In Nov. 1925 an Italian under sentence for another murder confessed that he had participated in the Braintree crime and exonerated Sacco and Vanzetti. Judge Thayer refused a new trial, alleging that the confession had been made solely that the criminal might delay his own execution. An appeal to the State Supreme Court failed, it being held that the trial judge had the final power to determine a matter of retrial. On 9 April 1927 Judge Thayer sentenced the men to the electric chair. A great outcry arose, not only in the U.S.A. but throughout the world at the thought that one judge should pass judgment upon all the facts and motions in the case, with no review by a higher court. Finally, a despairing appeal was made to Governor Fuller, who promised to review the papers in the case. At the same time he named President Lowell of Harvard Univ., President Stratton of the Massachusetts Institute of Technology, and Robert Grant to make an independent investigation. Both the governor and the committee found no ground for retrial or clemency, and the men were executed, 23 Aug. 1927, protesting their innocence to the last. There still remains in the minds of many lawyers a grave fear that

there was a miscarriage of justice. See O. K. Fraenkel, *The Sacco-Vanzetti Case*, 1931.

Vapereau, Louis Gustave (1819-1906), Fr. author, b. Orleans. He became a teacher of philosophy, then an advocate, and finally abandoned law for letters. His *Dictionnaire universel des contemporains*, 1858, and his *Dictionnaire universel des littératures*, 1877, are his best-known works.

Vapinicum, see GAI.

Vaporisation, see EVAPORATION.

Vaporising Oil, see KEROSENE.

Vapour, see GAS AND GASES.

Var: 1. Riv. of France, which rises in the Alpes Maritimes (see ALPS), and flows across the dept of Alpes-Maritimes to the Mediterranean 4 m. SW. of Nice (q.v.). Length 84 m.

2. Dept. of SE. France, in Provence (q.v.), with a coast-line on the Mediterranean (including part of the Riviera, q.v.). It has a much-indented coast-line, is generally hilly and wooded (outliers of the Alps of Provence in the S.), and is drained by the Argens. The climate is warm and dry. Fruit, flowers, vines, and olives are produced in coastal dists., there are bauxite, lead, zinc, and salt deposits, and there are shipbuilding and armament industries. There are 2 arrons., Draguignan and Toulon (qq.v.). Resorts include Hyères, Fréjus, and St-Raphaël (qq.v.). The cap. is Draguignan. Area 2333 sq. m.; pop. 413,000.

Varangians, or **Varings**, name given by the Greeks and Slavs to the Norsemen who threatened Constantinople in the 9th and 10th cents. From 988 until the Turkish capture of Constantinople in 1453 there was a body of Varangians in the imperial guard.

Varaždin, tn in Croatia, Yugoslavia, on the Drava. It was a free city in the Middle Ages, and its anct fortifications remain. It has textile manufs., and is a growing industrial tn. Pop. 19,400.

Vardar, see AXIUS.

Vardø, seaport of the co. of Finnmark, Norway, at the entrance to Varanger Fjord. There is a 14th cent. fortress. Much cod-fishing is carried on, and fish and cod-liver oil are exported. Pop. 3100.

Varenus, Bernhardus (or **Bornhardus**), see GEOGRAPHY, *Exploration*.

Varese: 1. Prov. of Italy, in NW Lombardy (q.v.). It is in the Alps (q.v.), and is bounded on the N. and NE. by Switzerland. Lake Maggiore (q.v.) is on the W. boundary of the prov. There are iron, silk, and cotton industries. The prin. tns include V., Busto Arsizio, and Gallarate (qq.v.). Area 470 sq. m.; pop. 501,000.

2. It. tn. cap. of the prov. of V., 26 m. NW. of Milan (q.v.). It is a modern tn, with villas and gardens, and has a 16th-17th-cent. basilica, and an 18th-cent. palace. There are machinery, motor-car, furniture, textile, and brewing industries. Pop. 57,000.

Vargas, Gerulio Dornellas (1883-1954), Brazilian statesman, b. São Borja. He was the focus of the revolution of 1930, and was President of the Rep. from 1930

to 1934; he was again elected, but resigned in 1945. Dictatorial and forceful, he crushed Brazilian constitutionalism, and by his efficiency won support from classes which had formerly sided with the constitutionalists. Mounting economic problems of the post-war ministry which he formed in 1951 resulted in his suicide.

Vargas, Luis de (1507-1568), Sp. painter, b. Seville. He studied art in Rome, and was one of the leading Sp. artists of the Renaissance. His altar pictures and church frescoes are very fine, and particularly good examples can be found in Seville. See A. L. Mayer, *Die Sevillaner Malerschule*, 1911; V. von Loga, *Die Malerei in Spanien*, 1922.

Variable Stars. Many thousand of stars exist whose luminosity is variable; such stars are called V. S. The different characters of the variations led E. C. Pickering to group them into 5 classes according to their periods and features of variation. These are: (1) eclipsing variables; (2) cepheid variables; (3) long-period variables; (4) irregular variables; (5) novae or temporary stars. Eclipsing variables (sometimes known as eclipsing binary stars) differ from the other classes by the fact that they are not intrinsically variable in brightness. Their variations are caused by the mutual eclipses of the binaries, one component passing between the other and the earth, thus cutting off some of the light from the other, the amount of which depends on the inclination of their orbital plane to the line of sight of terrestrial observers. The best-known instance of this class is Algol, which consists of a bright and a comparatively dark star revolving around their common centre of gravity in 2 days 21 hrs. Cepheid variables are generally regular in period of variation and also in their light-curve, and have periods between a few hrs and about 50 days. For further information see STAR. Long-period variables include those stars whose periods range from about 2 months to 2 years or more, the greatest frequency occurring near the period of 300 days. The variation extends over sev. magnitudes, and in the case of χ Cygni exceeds 8 magnitudes. These stars generally belong to the M,N,R,S spectral types and the most famous of this class is α Ceti or Mira (q.v.). Sev. theories have been advanced to explain the causes of stellar variability, but these are open to various objections. The fact that many stars contract and expand rhythmically under the force of gravity in the first case and under increasing temp. in the second case, suggests that an explanation may be found here, but there are difficulties in accepting this as a final explanation. Irregular variables have a narrow range of variation—seldom more than half a magnitude and often less than this—and their behaviour is more or less unpredictable. The percentage of such variables increases with increasing redness of the stars. Betelgeuse is the brightest star among the irregular variables and it is known that this star varies considerably in its diameter,

but it has not been decided whether such pulsations keep in step with variations in brightness. Even if this were proved it would not necessarily follow that variations in the Cepheids were due to the same cause. Other well-known irregular variables are R Coronae Borealis and U Geminorum, the former remaining uniformly bright for a long time and then becoming much more faint, returning after a period which cannot be predicted to its normal condition. This star is typical of many others which behave in a similar manner. Others resemble U Geminorum, in which the light remains practically the same for a long time, but at intervals increases rapidly and afterwards fades more slowly. It is remarkable that while the R Coronae Borealis stars tend to congregate in the neighbourhood of the Milky Way the U Geminorum stars show no preference for this region. Novae or temporary stars rise quite suddenly and unexpectedly from obscurity or invisibility and appear in many cases as bright stars. See NOVAE.

Variation, Calculus of. In the differential calculus many problems arise in connection with finding values of a variable x for which a given function $f(x)$ is a maximum or a minimum. For instance, let us suppose that we have a line of definite length a and we want to divide into 2 parts so that the product of their lengths is a maximum, we proceed as follows. Let the length of one part be x , then the length of the other part is $a - x$, and the product, which will be called y , is $ax - x^2 = y$. To obtain the maximum or minimum values of the product we differentiate y with respect to the variable x , and obtain $dy/dx = a - 2x$. Equating this to zero we find $x = \frac{1}{2}a$, so the line would be bisected to give the maximum value. It is shown elsewhere how to use certain criteria to determine whether the value thus found is a maximum or minimum (see MAXIMA AND MINIMA).

This is a very simple case and the general problem is more complicated. The invention of the Calculus of Variations is due to John Bernoulli, who proposed the following problem in 1696 and solved it: A particle under the action of gravity is constrained to move from a point A to another point B along a smooth plane curve. What is the nature of the curve so that the time of descent is a minimum? It was shown that the equations of the curve were $x = a \sin^2 \theta$, $y = a(\theta - \sin \theta \cos \theta) + b$, where a and b are arbitrary constants. This curve is the well-known cycloid (see CURVE).

See I. Todhunter, *On the Calculus of Variation*. 1871; G. A. Bliss, *The Calculus of Variations*, 1925; A. R. Forsyth, *Calculus of Variations*, 1947.

Variation, in Biology. It is a matter of common observation that offspring differ to a certain extent from their parents. Such V. in plants and animals is of the greatest importance, since it provides a means whereby evolution has taken place: without V. evolution is clearly impossible. V.s are of 2 main kinds, *fluctuations*, which are small and continuous V.s in

size, colour, shape, and the like, as for instance gradations in the height of man, and *mutations* or sports, which are larger V.s such as those seen in the Manx cat, the Shirley poppy, the fastigiated Yew, and numerous mutations of the Evening Primrose (*Oenothera*) first described by de Vries. C. Darwin relied chiefly on fluctuations as providing the raw material for evolution, but the modern tendency is to regard mutations as more important, since they are definitely inherited. The cause of mutations must lie in some disturbance of the chromosomes, as for example, in a multiplication in their number, a phenomenon known as *polyploidy*. Mutation can be induced artificially, by such means as radium, X-rays, the plant derivative colchicine, and mustard oils, and it is possible that cosmic rays perform this role in nature. See also CHROMOSOMES; EVOLUTION; EUGENICS; HEREDITY.

Variation, Magnetic, see DECLINATION, MAGNETIC.

Variations. One of the important musical forms, the principle of which is the statement of a theme followed by varied treatments of it, sometimes with a restatement of the theme in its first form at the end (e.g. Bach's *Goldberg V.*), sometimes with a more elaborate final section, such as a fugue (e.g. Beethoven's *Eroica V.* for piano, or Brahms's *Handel V.* for piano), a passacaglia (e.g. Brahms's *Haydn V.* for 2 pianos or orchestra). There is at least one instance (d'Indy's *Jstar*) where the theme does not appear in its primitive form until the end. Historically the V. principle goes back as far as instrumental music, but sets of V. first emerge towards the end of the 16th cent., especially in England and Spain. The Eng. virginal masters wrote sets on popular tunes for their instruments and another favoured medium for V. was the lute. In 17th cent. England, V. were called *Divisions* because they split up the theme into smaller rhythmic patterns, and they could be based on a Ground, i.e. an unchanging bass. The later hist. of the form continues to show the two different tendencies of (1) varying the tune, and (2) maintaining the foundation of the same bass, with greater or less incidental changes while the superstructure can be handled very freely and need not keep to the melodic tune of the theme at all. Mozart's V., for example, are predominantly melodic, and so are Beethoven's earlier sets, but the latter reverts to the 'ground' type by keeping chiefly to the harmonic framework in such a work as the *Diabelli V.*, and in the 32 V. for piano he keeps so close to the bass that the work is more like a passacaglia, which is true also of the finale of Brahms's fourth Symphony. In Elgar's *Enigma V.* for orchestra, each one of which represents a portrait of one of the composer's friends, and in R. Strauss's *Don Quixote*, the form is complicated by an element of programme music (q.v.).

Varicose Veins, condition in which the veins are enlarged, being increased in length as well as in girth. The valves of

the veins are incompetent and allow the blood to leak past them in a direction away from the heart. They are found in the lower part of the body, affecting the lower leg and thigh, causing haemorrhoids or piles in the rectum if the rectum be involved, and varicocele when the spermatic cord is affected. They are caused by occupations involving a great deal of standing, constriction such as that caused by tight garters, or pregnancy; or may be associated with general debility or a hereditary tendency. V. V. tend to become worse if left untreated. They may rupture and become ulcerated. A mottled appearance of the legs is a less serious condition caused by enlargement of superficial veins when the legs are placed regularly too near a fire.

Variety, see VARIATION; CLASSIFICATION, PLANT.

Variola, see SMALLPOX.

Varius, Rufus Lucius, Rom. poet of the 1st cent. BC. Maecenas was his patron, and he was a friend of Horace and Virgil, becoming a literary executor of the latter (19 BC). His tragedy *Thyestes* was highly valued, and he also wrote epics. Only fragments are extant.

Varley, Cornelius (1781-1873), water-colour painter, younger brother of John V. (q.v.), b. London. He exhibited occasionally in the Royal Academy, and was also the inventor of various scientific instruments. His works consist chiefly of carefully finished classical and architectural subjects, and also some figures.

Varley, John (1778-1842), water-colour painter, b. Hackney, became a successful art teacher in London, but made several sketching tours amid the picturesque and inspiring scenery of N. Wales. He exhibited in the Royal Academy, and his output was very large. He had a great number of pupils, including W. H. Hunt, John Linnell, and Turner of Oxford. He believed in astrology and was the friend of Blake, who drew his 'visionary heads' at V.'s house.

Värmland, län (co.) of Sweden, to the N. of the Vener Lake, and bordering on Norway. Forestry is carried on, and there are mines and sev. industries in the E. part. Area 7427 sq. m.; pop. 272,500.

Varna (called Stalin in 1949; anct Odessos or Tiberiopolis), city of E. Bulgaria, cap. of V. prov., built on a sandy isthmus on the Black Sea, 230 m. ENE. of Sofia (q.v.). It was founded by the Greeks in the 6th cent. BC, and was subsequently ruled by the Romans and the Byzantines. It was in the hands of the Bulgarians in the 13th-14th cents. It was sacked by the Turks in 1391, and the Turks defeated the Hungarians here in 1444. It was ceded to Bulgaria in 1878. There are anct churches and mosques, a univ., and a naval academy. The port is busy, there is a spa, and there are engineering (including shipbuilding), textile, leather, foodstuffs, and other industries. Pop. 78,000.

Varnhagen von Ense, Karl August (1785-1858), Ger. author, b. Düsseldorf. In 1814 he married Rahel Levin, a christianised Jewess and a remarkably

cultured woman, who gathered round her the chief men of letters and savants of her day. V. is chiefly famous as a biographer; among his works are *Musculmanach*; *Goethe in den Zeugnissen der Mitlebenden*, 1823, *Biographische Denkmale* (5 vols.), 1824-30. His correspondence with Carlyle and with his wife has been pub. See study by C. Misch, 1925; and a life of Rahel by L. Feist, 1927.

Varnish Tree, evergreen tree, *Aleurites cordate*, of the family *Aria cardiacae*. It flourishes in China and the E. Indies; its timber is one of sev. kinds known as *lignum vitae*. It owes its name to the lac in its seeds, a resinous secretion exuded by certain insects.

Varnishes are transparent surface coatings consisting of resins or resins and oils thinned with suitable solvents. The simple resin solutions are usually called spirit V., having no exterior durability, and are hard and brittle, although additions of plasticisers may to some extent offset this. A typical spirit varnish would consist of soft Manila copal in methylated spirit or industrial alcohol, and is sold as crystal paper varnish. Alcoholic solutions of Sandarac resin are used for coating maps and drawings, etc. The term varnish is, however, mainly used to describe solutions of resin in oil, thinned with turpentine (q.v.), white spirit, or other suitable solvents. For many years the natural resins were employed exclusively for this purpose. These are derived from fossil or more recent forest remains, and usually bear the name of the dist. of origin, e.g. Congo copal or Sierra Leone copal. Natural resins have to undergo a process known as 'running,' which consists of heating them at a temperature of over 300° C. in a varnish pot so that certain chemical changes take place and acidic fumes are driven off, to the extent of about 25 per cent of the weight of the resin. Linseed oil is then introduced little by little, and the cooking process continued until the varnish is of the right 'body' or thickness. Driers and turpentine or white spirit are then added and the finished varnish is allowed to stand for several months, both to mature and to allow dirt and other undesirable impurities to settle. Whilst considerable quantities of V. based on natural resins are still made, synthetic resins are being increasingly used for varnish manufacture. V. made from phenolic resins are more resistant to water and chemical attack, and V. based on alkyd resins have better gloss retention and greater durability. A further group is often classified with V., this being the solutions of pitches and asphaltums, either alone or in admixture with resin and/or oils. These, however, are not strictly speaking V. or paints, but occupy a position on their own.

See H. W. Chatfield, *Varnish Constituents*, 1953, *Paint and Varnish Manufacture*, 1955.

Varnsdorf (Ger. Warnsdorf), Czechoslovak tn in the region of Liberec (q.v.). It is a railway junction and has textile manufs. Pop. 15,700.

Varro, Gaius Terentius, Rom. gen. Of low birth and ultra-democratic opinions, he was chosen, despite the opposition of the aristocracy, to bring the war against Hannibal to an end (216 BC). His fellow consul, L. Aemilius Paulus, was one of the leaders of the aristocratic party. The two consuls were defeated by Hannibal at the historic battle of Cannae (q.v., and also ROMAN HISTORY), which was fought by V. against the advice of Paulus, who was killed in action. V. was one of the few who escaped and was subsequently made responsible for the disaster. His conduct after the battle, however, in organizing precautionary measures against the Carthaginians, won high praise. He was ambas. to Philip of Macedon, 203, and to Syphax, King of Numidia, 200 BC.

Varro, Marcus Terentius (116-27 BC), Rom. antiquary, b. Reate. He fought for Pompey in the Civil war, but was allowed by the second triumvirate to retire into private life (c. 42 BC). V. is known to have written about 70 works on antiquarian subjects and 150 Menippean satires; but, apart from numerous fragments, we possess only the *De Re Rustica* and 6 of the 25 books of *De Lingua Latina*. A good deal of information derived from his *Indiquitates Rerum Humanarum et Divinarum* has been preserved by Aulus Gellius, Macrobius, and St Augustine (*De Civitate Dei*). See the ed. of *De Re Rustica* by G. Goetz, 1922, of Books V-X of *De Lingua Latina* by F. Schoell and G. Goetz, 1910. Both these works have been ed. with trans. in the Loeb Library, the former by W. D. Hooper and H. B. Ash, 1934, the latter by R. G. Kent, 1938.

Varuna (cf. *Gk Ouranos*), anct Vedic god of day; also the god of water.

Varve-analysis, the method of counting annual layers in sedimentary geological deposits with the object of obtaining a relative chronology. In Sweden, where this scientific method of dating the past was first studied by Baron de Geer in 1878, each layer or varve was regarded as a year's accumulation of silt in the melt-water of an ice-sheet, and a continuous sequence along the retreat of the ice-sheet was demonstrated. There have been attempts to correlate the varve-series in Sweden with that in America, but such teleconnections are not yet established to the satisfaction of all archaeologists. See F. K. Zeuner, *Dating the Past* (1950 ed.), Chapter 2. See also ARCHAEOLOGY.

Varves (Swedish, *varv*, a complete turn or circle), laminae in a clay or similar sediment which each represent the deposit of a single year. Varved clays are formed in lakes to which the supply of water shows a seasonal variation, due to the summer melting of glaciers, or to the alternation of wet and dry seasons. This variation affects the nature and abundance of the sediment deposited, and a single varve may therefore show a regular change of colour or grain-size from bottom to top. Since the seasonal cycle is repeated year after year, successive V. resemble each other in appearance. If it can be estab. that a laminated clay is a

varved deposit, and that each varve represents the accumulation of a single year's sediment, it is possible by counting the number of V. to find the length of time taken by the accumulation of a given thickness of rock, and this method of dating has been used in the study of varved sediments deposited around the fringes of the great Pleistocene ice-sheet in Canada and Scandinavia.

Vas County, see SZOMBATHELY.

Vasa, Gustavus, see GUSTAVUS.

Vasari, Giorgio (1511-74), It. historian of art, b. Arezzo. He studied under Michelangelo, and during his lifetime was famous as a painter and architect but it is now recognised that his paintings lack inspiration. He is chiefly remembered as an art historian unbiased and with a very engaging literary style. There is critical merit besides trustworthy fact in his celebrated *Lives of the most eminent Painters, Sculptors, and Architects*, 1550; an Eng. trans. has been reprinted in the Everyman's Library (1949). It was partly rewritten and enlarged in 1568, and contains his autobiography. See W. Kallab, *Vasari-Studien*, 1908.

Vasco da Gama, see GAMA, VARCO DA.

Vascongados, see BASQUES.

Vascongadas, Provincias, see BASQUE PROVINCES.

Vascular System (Lat. *vasculum*, a little vessel), of animals. This is the system of tubes, present in most animals, and conveying blood to and from different parts of the body. See also CIRCULATION OF THE BLOOD, *Comparative*; HEART. **Vascular System**, of plants, is a series of cells and vessels conducting sap from the roots to the leaves, and the soluble products of photosynthesis from the leaves to various parts of the plant. In the higher plants the vascular tissue consists of wood or xylem and bast or phloem, but in the lower plants, such as the mosses and liverworts, there are merely conducting strands of thicker-walled cells. In stems (q.v.) the xylem and phloem masses are collateral; in roots (q.v.) they alternate. They may be arranged in separate vascular bundles, as in the Phanerogamia (q.v.), or in concentric cylinders, the phloem being outermost, as in many Ferns (q.v.). As girth increases, more vascular tissue may be formed by the activity of the cambium (q.v.) in secondary growth. See L. J. F. Brimble, *Intermediate Botany*, 1953.

Vase, see references under CERAMICS; see also PORTLAND VASE.

Vaseline, term coined by Robert A. Chesebrough about 1870 and used by Chesebrough Manufacturing Company, Consolidated, as its registered trade mark upon the company's line of products, the chief of which is petroleum jelly, which is a semi-solid mixture of hydrocarbons, distilled from petroleum and purified, and used largely as an unguent, lubricant, etc.

Vassal, see FEUDALISM.

Vassar College, New York, for the higher education of women, was founded by Matthew Vassar (1792-1868) in 1861. It occupies about 950 ac. at Pough-

keepsale, 3 m. from the Hudson R., and has 75 buildings, including a fine library (300,000 vols.), chapel, art gallery, hall of casts, etc. In 1956 the number of students was 1400. Faculty, administration, and staff number more than 350.

Västerås, or **Vesterås**, cap. of the co. of Västmanland, Sweden. It is an old tn, with a cathedral and an episcopal library. Pop. 68,276.

Västerbotten, or **Vesterbotten**, co. of Sweden, between Norway and the Gulf of Bothnia. Lumbering is important. Cap. Umeå. Area 22,839 sq. m.; pop. 236,562.

Västernorrland, or **Vesternorrland**, co. of Sweden, between Jamtland and the Gulf of Bothnia. Lumbering is important and there are exports of wood pulp. Cap. Härnösand. Area 9925 sq. m.; pop. 279,300.

Västmanland, or **Vestmanland**, co. of Sweden, between Västmanland and Örebro. Iron and silver are mined, and iron goods and pig iron produced. Cap. Västerås. Area 2611 sq. m.; pop. 213,723.

Vasto, lt. tn, in Abruzzi e Molise (q.v.), 31 m. S.E. of Chieti (q.v.). It is on the Adriatic coast, on high ground overlooking fine beaches, and is known for its olives. Wine, bricks, and silk are also produced. Pop. 20,300.

Vat Dyes, see **DYE**.

Vatican, **The**, residence of the Popes since their return from Avignon in 1377. Previously the home of the Popes had been the Lateran, but they had long possessed a palace in the Vatican hill next to St Peter's. In 1377 the Lateran palace was in ruins, and Pope Gregory XII decided to make the V. his permanent residence. Subsequent building has made it a vast collection of edifices, containing over 4000 rooms, used mainly for museums or administrative purposes. The residential part is relatively small. Among its artistically famous units are the chapel of San Lorenzo (built under Nicholas V. d. 1455), the Appartamento Borgia (built under Alexander VI. d. 1503), the world-famous Sistine Chapel (built under Sixtus IV. d. 1484), containing the masterpieces of Michelangelo ('The Last Judgment' and the 'creation'), Botticelli, and Ghirlandajo, and the Loggia of Julius II (d. 1513). The actual residence of the Pope is of later date, being built under Sixtus V (d. 1590), and Clement VIII (d. 1605). Adjoining the palace are the Museums, 5 in number, containing the finest collection of Graeco-Rom. sculpture in existence, and including Egyptian and Etruscan depts. In the Pinacotheca and elsewhere are the choicest works of Raphael, Perugino, Domenichino, and Titian. The grand corridor of the V. library is the longest room in the world, being 4 m. in length. The V. is also an institute of scientific research, for which its archives (35,000 vols. and 120,000 letters, documents, etc.), and its library (upwards of 356,000 vols. and 60,000 documents) make it the most important centre for historical research in the world. There is also a V. observatory, the Polyglot Press, and

the Galleria Lapidaria, containing 6000 stone inscriptions.

The V. is also the administrative centre of the Rom. Catholic Church. Here are held conclaves for the election of the Pope, consistories for the creation of cardinals, and here a number of the Rom. congregations (i.e. depts for the administration of Church affairs) hold their meetings. In particular, the cardinal secretary of state, i.e. the cardinal in charge of foreign policy, has his offices in the V. The ensemble of buildings covers an area of 1151 ft by 767 ft, and represents one of the most historic architectural records of the world. The policing of the V. is mainly in the hands of the famous Swiss Guards, formed by Julius II in 1505.

Vatican City, area adjacent to St Peter's, being the independent state governed by the Pope, and the smallest state in the world (108 ac.). It lies almost entirely N. and W. of the basilica of St Peter and is bounded by the Piazza di San Pietro, the Via di Porta Angelica and the Via di Leone IV on the E.; the Viale Vaticano with very high walls completes the enclosure on the other sides. The pop., i.e. those having permanent residence in the Vatican, is about 600. The V. C. has its own governor, post office (with stamps), coinage, law courts, and railway train, connecting with the lt. station of S. Pietro in Trastevere. Cavour had tried to settle the Rom. question but had failed; negotiations begun in 1926, ended in the signing of the Lateran treaty between Cardinal Gasparri and Mussolini on 11 Feb. 1929, by which the Papal states were renounced by Pope Pius XI and (it is said) Vaticano (V. C.) came into being. Its neutrality was violated by the Germans in 1943, when they occupied it with paratroops. See also **VATICAN** and **CHURCH**, **STATE** OF **THE**.

Vatican Council, last oecumenical Council of the Rom. Catholic Church, 1870. It is principally famous for the promulgation of the doctrine of papal infallibility. The Council opened on 8 Dec. 1869, with about 600 members present. A considerable number of the bishops considered such a definition inopportune, but the majority favoured it, and finally, on 18 July 1870, 433 out of 435 persons present voted for the definition. In England Newman and Acton, who had considered it inopportune, submitted afterwards. In Germany Dollinger rejected it and founded the denomination known as the Old Catholics. The Council also promulgated an important constitution on the relationship between faith and reason. See C. Butler, *The Vatican Council*, 1925.

Vatnajökull, perpetual icefield in the S.E. of Iceland, by far the largest in Europe, with an area of c. 3300 sq. m. Except for Óraefajökull (q.v.), in reality part of it, the maximum altitude of V. is 6562 ft. Under this colossal mass of ice are several volcanoes which are constantly more or less active, and eruptions are fairly frequent. They always cause some damage, and sometimes work fearful havoc, for they are accompanied by

terrible floods, the fire melting the ice and breaking it up into huge icebergs, which then are carried along by the floods. V. was first crossed in 1875, by an Englishman, W. L. Watts. See his *Across the Patna Jökull*, 1876.

Vätter, lake of Sweden, connected with the Baltic Sea and Lake Vänar by means of the Göta Canal. 75 m. long, and just over 10 m. wide, its picturesque shores and clear limpid waters make it one of the most beautiful lakes in Sweden. It is dotted with is., one of the chief being Visingsö.

Vauban, Sébastien le Prestre de (1633-1707), marshal of France, and military engineer, b. St Léger. He served under Condé in Spain, and in 1658 he was France's chief engineer under Turenne. In 1678 he became 'commissaire-général des fortifications' and proceeded to strengthen the frontier defences, building the fortresses of Landau and New Breisach, etc., and rebuilding Strasburg (1681). But besides constructing or improving over 150 strongholds, he conducted 40 sieges, including those of Lille (1662), Maastricht (1673), Cambrai (1677), Ghent (1678), Namur (1692), and Old Breisach (1703). Made a marshal of France in 1703, his latter days were darkened by royal displeasure and neglect. See also FORTIFICATION. See lives by D. Halévy (Eng. trans., 1924); P. Lazard, 1934; Sir R. Blomfield, 1938.

Vaucluse, dept of SE. France, lying on the E. bank of the lower Rhône (q.v.) and the N. of the Durance (q.v.). It consists of parts of the Comtat Venaissin and Provence (q.v.). In the E. it contains outliers of the Alps of Provence, and it is drained by the Eygues, Sorgue, Ouvèze, and Coulon Rs. It is known for its wines (Châteauneuf-du-Pape), and for its fruit. Olives, cereals, silk, and live-stock are also produced. The chief industries are the manuf. of textiles, chemicals, and foodstuffs. There are 3 arrons., Avignon, Carpentras, and Apt (qq.v.). The cap. is Avignon. The name V. comes from a vil., 15 m. E. of Avignon, where there is a spring (the origin of the R. Sorgue) celebrated by Petrarch (q.v.). Area 1387 sq. m.; pop. 268,350.

Vaud (Ger. Waadt), canton of SW. Switzerland. The canton is in the shape of a triangle, the base of which extends along the N. shore of Lake Geneva. The chain of the Jura Mts cuts through it in a SW. to NE. direction. The ter. of V. was owned successively by the Romans (BC), the French, the emperors of Germany, the Dukes of Zähringen, and the house of Savoy. It did not become an independent canton until 1798, and entered the Confederation in 1803. V. is the most prominent vine-growing canton in Switzerland. Wine, chocolate, tobacco, clocks, and condensed milk are among the chief objects of industry or export. Salt is mined in Bex dist. Cap. Lausanne (q.v.). Area 1238 sq. m.; pop. (1955) 392,800, French-speaking, mainly Protestant.

Vaudeville, play in which dialogue is interspersed with songs. The word is a

corruption of Vaux de Vire, the name of 2 valleys in Normandy. In the 15th cent. one Olivier Basselin, of Vire, composed a number of drinking songs, which spread over France, bearing the name of their native place. V. in the U.S.A. has the same implications as variety in Great Britain.

Vaudouis, see WALDENSES.

Vaughan, Charles John (1816-97), divine, b. Leicester, and educ. at Rugby and Trinity College, Cambridge. V. was ordained in 1841 and appointed to his father's former par. In 1844 he was chosen for the headmastership of Harrow, which position he held with distinction until his resignation in 1859. He then began to train groups of men for ordination, and continued this work when he accepted the mastership of the Temple in 1869, and the deanery of Llandaff in 1879. Numerous religious works and sermons were pub. by him, his first vol. being *Memorials of Harrow Sundays*, 1859.

Vaughan, Henry (1622-95), poet, b. Llansantffraed, Brecknock. As a native of the land of the anct Silures, he called himself 'Silurist.' Educ. at Oxford and London, he settled as a physician at Brecon and Newton-by-Usk. He seems to have served in the Royalist forces, though no exact details are known. His first book, *Poems, with the Tenth Satire of Juvenal Englished*, appeared in 1646. *Olor Iscanus* (The Swan of Usk), a collection of poems and trans. was surreptitiously pub. in 1651. About this time he had a serious illness which led to deep spiritual impressions, and thereafter his writings were almost entirely religious. *Silex Scintillans: Sacred Poems and Private Ejaculations*, 1650, his best-known work, consists of short poems full of deep religious feeling; it contains 'The Retreat,' a short, exquisite poem which suggested to Wordsworth his 'Ode on the Intimations of Immortality.' V. is an unequal poet, and even at his best not so careful an artist as George Herbert, but also at his best he is the more imaginative poet, if with less of tender fancy. His *Complete Works* were ed. by A. B. Grossart, 1871, and *Poems* by E. K. Chambers, 1896. See E. Blunden, *On the Poems of Henry Vaughan*, 1927; Elizabeth Holmes, *Vaughan and the Hermetic Philosophy*, 1932; F. E. Hutchinson, *Henry Vaughan: A Life and Interpretation*, 1947.

Vaughan, Herbert Alfred (1832-1903), cardinal, b. Gloucester. He was first educ. at Stonyhurst, thence went to a Jesuit school at Brugelette, Belgium, and afterwards to Rome in 1851 to study for the priesthood. At Manning's suggestion, V. was chosen to succeed Dr Turner as Bishop of Salford in July 1872. On the death of Manning in Jan. 1892, he was appointed Archbishop of Westminster, and enthroned at the pro-cathedral, Kensington, 8 May. The following year he received a cardinal's hat from the hands of Leo XIII. He founded St Joseph's College for foreign missions at Mill Hill. In July 1894 V. started his great project for erecting a cathedral at

Westminster, which he lived just long enough to see consummated. *See* life by J. G. Sneed-Cox, 1910.

Vaughan Williams, Ralph (1872-), composer, b. Down Ampney, Gloucestershire, educ. at Charterhouse and Trinity College, Cambridge. He studied music at the Royal College of Music in London (1890-2, 1895-6), and later briefly with Bruch in Berlin and Ravel in Paris. He took the Mus.D. at Cambridge in 1901 and made his first major success with *Toward the Unknown Region* at the Leeds Festival of 1907. After serving in the First World War he was appointed prof. of composition at the Royal College, where for some 30 years he had many pupils who have since made distinguished careers. He received the Order of Merit in 1935. Although a great upholder of the finest Eng. musical traditions and an ardent enthusiast for Eng. folksong, he was also progressive, so much so that he was often represented among many far younger men at the festivals of the International Society for Contemporary Music in various European centres. Even in works written when he was nearing his eightieth year, such as the sixth Symphony and the *Sinfonia antartica*, he enterprisingly introduced new ideas or devices, and the fourth Symphony of 1935 is as audacious as any work contemporary with it. His very large output includes the operas *Hugh the Drover*, 1922, *Sir John in Love*, 1929, *The Poisoned Kiss*, 1936, *Riders to the Sea* (Synge), 1937, and *The Pilgrim's Progress*, 1922; the masque for dancing *Job* (after Blake's illustrations), 1930; incidental music for *The Wasps* of Aristophanes, 1909; church and film music; very many choral works, e.g. *A Sea Symphony*, *Flos Campi* (with solo viola), oratorio *Sancta Civitas*, *Magnificat*, *Dona nobis pacem*, *Five Tudor Portraits*; *Serenade to Music* (Shakespeare) for 16 solo voices and orchestra; much orchestral music, e.g. *A London Symphony*, *Pastoral Symphony*, Symphonies Nos. 4-9, *Fantasy on a Theme by Tallis* for strings; *The Lark Ascending* for violin and orchestra, and var. concertos; 2 string quartets; *On Wenlock Edge* (Housman) for tenor, string quartet, and piano; many song cycles and separate songs. His splendid hymn-tune *For All the Saints* is known to thousands who have never heard any other music of his and to many who perhaps do not even know his name. *See* books by H. Foss, 1950, and P. M. Young, 1953; also studies on separate aspects in *Musical Pilgrim* series by A. E. F. Dickinson and F. Howes.

Vault, in architecture, a continuous arch of brick, stone, or concrete, forming a self-supporting roof over a building or part of a building; also, a vaulted structure, e.g. under a street-pavement. The principle of the V. was known in Babylonia and Egypt 6000 years ago; but was rapidly developed by the Romans, who made great strides in their skilful use of concrete; by the Sassanid rulers of Persia in the 6th-7th cents AD, using brickwork on the grand scale;

and by medieval builders throughout E. Europe.

The Romans used barrel V.s or tunnel V.s: the line of intersection of such V.s is called a 'groin' (*see* A in illustration). Barrel V.s were thick and heavy. During the Romanesque period they were lightened by the introduction of stone ribs, carrying a thin stone 'web,' just as the steel ribs of an umbrella support the thin cover. The resulting V., however, also assumed the convex shape of an umbrella (B). This led to various difficulties, especially where the nave of a church was twice the width of each aisle; because the wide round arch of the nave was far taller than the narrow arches over the aisles. In the early Gothic period, however, the introduction of pointed arches (C) solved this problem; for they could be made more or less pointed to suit the varying widths of nave and aisles, and thus it became possible to construct a vaulted roof of which the top (or 'crown') was level at the ridge. Vaulting grew progressively more complicated during the later Gothic period, as intermediate ('lierne') ribs were added, and the thickness of the stone 'web' was reduced to 6 in. or so, while the use of massive buttresses enabled walls between the buttress to be much thinner, and to be pierced over much of their surface for great windows of stained glass. Thus a late-Gothic vaulted building became a skeleton of stone ribs and buttresses.

Fan vaulting, peculiar to England and introduced during the last phase of Gothic, went even farther (D); and elaborate but superfluous carved stone pendants were hung to the underside of the vaulting for purely ornamental purposes. The conoidal underside of the V. was carved into tracery, thus producing the effect of a fan as seen from below—hence the name. (*See* diagram, p. 408.)

Vauquelin, Louis Nicolas (1763-1829) Fr. analytical chemist, b. Saint-André, Normandy. He obtained an introduction to Fourcroy (q.v.) and was then able to devote his time to chemical analysis. V. held various posts, including those of prof. of chemistry at the Collège de France, commissioner on the pharmacy laws, and eventually succeeded Fourcroy on the faculty of medicine at Paris (1809). He discovered chromium, glucina (beryllium), and, with P. J. Robiquet, asparagine. He is also known as the discoverer of quinic acid and other naturally occurring compounds; he conducted valuable researches in lactic acid, alum, and naphtha.

Vauquelin de la Fresnaye, Jean, Sieur des Yveteaux (1536-1608), Fr. poet, b. at the château de La Fresnaye, near Falaise, studied classics at Paris and law at Poitiers and Bourges. He is notable as the author of *Satyres françaises*, addressed to various distinguished contemporaries, the earliest collection of regular satires in France, which were, however, to a great extent borrowed from the Italians Sansovino and Ariosto. An admirer of Ronsard, his *Art Poétique*, 1575, formulated the tenets of the Pléiade. He was

author also of *Idylles*, with sonnets and epigrams, which appeared in 1605.

Vauvenargues, Luc de Clapiers, Marquis de (1715-47), Fr. writer and moralist, b. Aix-en-Provence. In 1741 V. was in garrison at Metz, and during the terrible retreat from Prague had both legs badly frost-bitten. Ruined in health, in 1745

Vauxhall, dist. and a parl. division in the bor. of Lambeth, London, once famous for its pleasure gardens (opened in 1660 and closed in 1859).

Vavau, one of the 3 main groups of is. of the Kingdom of Tonga.

Vazov, Ivan Minchev (1850-1921), Bulgarian author. At school he acquired

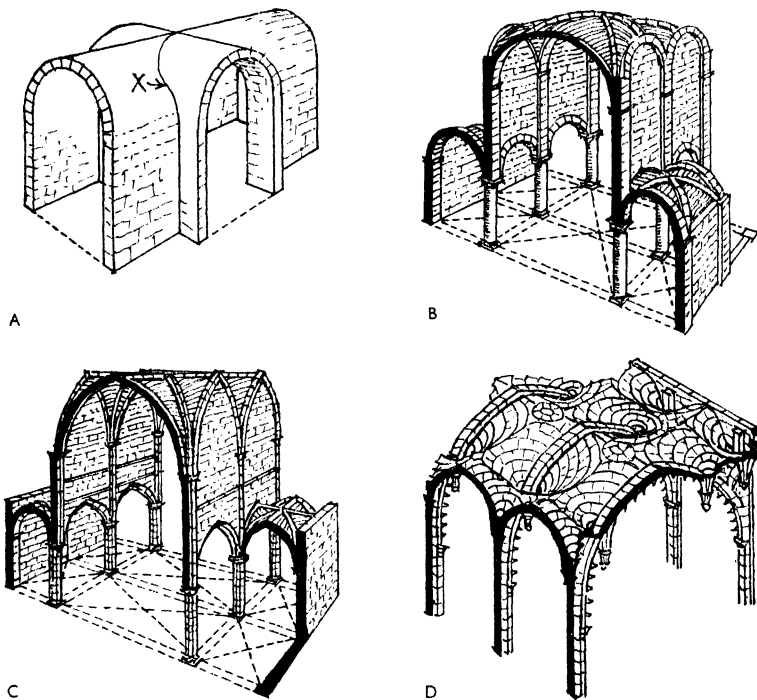


DIAGRAM SHOWING DEVELOPMENT OF ENGLISH VAULTING

A, Roman Intersecting Barrel Vaults (X = Groin); B, Romanesque Ribbed Vault; C Gothic Ribbed Vault; D, Late Gothic Fan Vault from Henry VII's Chapel, Westminster.

he settled quietly in Paris, and devoted himself to literature. The bulk of his work is small, but its merits are very considerable. His interest lies in the social institutions of man, and the play and development of human forces. His work was little noticed at the time, but has since steadily risen in fame. The *Œuvres complètes de Vauvenargues* were pub. by C. de Saint-Maurice in 1821; a new ed. by D. L. Gilbert in 1874; and a selection ed. by G. de Champbris, in 1942. See E. Lee, *La Bruyère and Vauvenargues*, 1903, and a study by F. Vial, 1938.

Vaux, Vicomte de Melun et de, see FOUQUET, NICOLAS.

a good knowledge of Russian and Fr. literature. His meeting with Karavelov (q.v.) and Botev (q.v.) in Rumania turned him to literature, which he was the first Bulgarian to adopt as a profession. He was compromised in the revolt of 1876, but escaped, to return next year with the liberating Russian army. From then on he lived in Bulgaria and Rumelia, except for a period of exile (1886-9) in Russia, where he wrote *Under the Yoke*, his most famous novel. He was minister of education from 1897 to 1899. Prolific in many genres, he excels as a poet and short-story writer. Everything he wrote was inspired by a great but clear-sighted

love of his country and his people, a love that is returned, for Bulgarians consider him their greatest author. He was a master of language, and immensely improved the flexibility and expressiveness of Bulgarian as a literary instrument. An Eng. trans. of *Under the Yoke* appeared in London, 1912, and of selected stories, in Sofia, 1950. P. Khristoforov pub. a study of V. in Paris, 1938.

Veadar, see ADAR.

Vecchi, Orazio (1550-1605), It. composer, b. Modena, took holy orders, became a canon at Correggio in 1586 and archdeacon in 1591, but deserted to his bp., wishing to devote himself to music, and became chapel master at the cathedral in 1596 and at the ducal court in 1598. He wrote church music, madrigals, and canzonets, but historically his fame rests on his madrigal-opera *L'Amfiparnaso*, 1594, a curious forerunner of comic opera proper with a dramatic plot for a number of characters, whose parts are sung by concerted voices in the madrigal style and not acted. In modern times this work has been very successfully performed with puppets.

Vecelli, Francesco (1483-1560), It. painter, the brother of Titian, whose jealousy he excited by his 'Transfiguration' for Salvatore. But his best picture is a 'Nativity' in the church of St Giuseppe at Belluno. Other works are 'Ecce Homo' (Dresden) and 'The Annunciation' (Venice).

Vecsca, see HUESCA.

Vecshe, in assembly in medieval Russia. It acquired supreme power in Novgorod, Iskov, and Vyatka; elsewhere it shared power with the local prince.

Vector. Physical quantities are of 2 kinds: scalars and vectors. A scalar is completely defined by a number and a unit or scale of measurement. Thus the temp. at any point of a body is completely determined by the number of degrees on a given scale. Mass, heat, atm. pressure, electric charge, potential, are scalars. A vector needs a number, a unit, and a direction for definition. Displacement, velocity, acceleration, force, are V.s. The size of a V. is called its tensor. Two vectors are considered equal if they are parallel (in the same sense) and have equal tensors. V.s are represented in diagrams by straight lines, an arrow indicating the sense. In diagrams any vector may be moved parallel to itself to a convenient position.

Vector Algebra. The sum of 2 vectors, a + b , with common origin is the diagonal in the parallelogram formed by a and b . If the origin of b is placed at the endpoint of a , the sum is the V. from the origin of a to the end of b . If a number of V.s are linked in this way into a chain, their sum is the V. from the origin of the first to the endpoint of the last.

Multiplying a V. by a scalar n simply increases its tensor in the ratio $n : 1$. If unit V.s i, j, k are marked on the axis of a rectangular system, i upwards, j towards the right and k forward, a vector a may be written $a_1i + a_2j + a_3k$, a_1, a_2, a_3 being the (scalar) components. The

scalar product of two V.s ab is defined as $ab \cos(a, b)$. Since $\cos 0 = 1$, $\cos 90^\circ = 0$, $\cos \alpha = \cos(-\alpha)$, we have $ab = ba$, $aa = a^2$, $i \cdot i = j \cdot j = k \cdot k = 1$, $i \cdot j = j \cdot k = k \cdot i = 0$, and, in terms of the components: $ab = a_1b_1 + a_2b_2 + a_3b_3$. The vector product $Vab = c$ is a V. of tensor $ab \sin(a, b)$, normal to the plane ab in a sense such that looking along c , the turning of a towards b is clockwise. Since $\sin 0 = 0$, $\sin 90^\circ = 1$, $\sin \alpha = -\sin(-\alpha)$, we have $Vaa = 0$, $Vab = -Vba$, $Vij = k$, $Vjk = i$, $Vki = j$. In terms of components, $Vab = (a_2b_3 - a_3b_2)i + (a_3b_1 - a_1b_3)j + (a_1b_2 - a_2b_1)k$.

Vector Analysis. Considering a scalar, like the temp., in its distribution over a portion of space, we have a scalar field, represented on a meteorological chart by isotherms joining points of equal temp., like contour lines on a map. At any point we define a gradient, a vector along the steepest rise of temp. whose tensor is the rate of increase with distance. The mathematical expression is $\text{grad } \theta = i \frac{\partial \theta}{\partial x} + j \frac{\partial \theta}{\partial y} + k \frac{\partial \theta}{\partial z}$. Drawing the lines of magnetic force due to a bar magnet, we have a representation of a vector field. The lines start from the N. pole and end on the S. pole. Drawing a closed surface round the N. pole, the lines emerging from the surface are a measure of the quantity of magnetism enclosed. The number of lines emerging from a closed surface not containing magnetism is equal to the number of lines entering. The vector field is related to a scalar quantity, represented by the difference between the number of lines emerging from, and the number of lines entering, a closed surface anywhere (cf. Gauss's Theorem, in electrostatics). The mathematical expression is the divergence of the vector,

$$\text{div } H = \frac{\partial H_x}{\partial x} + \frac{\partial H_y}{\partial y} + \frac{\partial H_z}{\partial z}. \text{ In the free}$$

field $\text{div } H = 0$. In the above field there are no closed lines of force. But in Faraday's experiment on electromagnetic induction, the insertion or withdrawal of a magnet along the axis of a ring induces an e.m.f. in the ring. A varying magnetic force generates an electric vector field in closed lines around the magnetic force. The mathematical expression is $\text{curl } E =$

$$\mu \frac{\partial H}{\partial t}, \text{ curl } E \text{ being a vector } i \left(\frac{\partial E_z}{\partial y} - \frac{\partial E_y}{\partial z} \right) +$$

$$j \left(\frac{\partial E_x}{\partial z} - \frac{\partial E_z}{\partial x} \right) + k \left(\frac{\partial E_y}{\partial x} - \frac{\partial E_x}{\partial y} \right).$$

In the discharge of a capacitor, the displacement current in the dielectric (q.v.) is $\frac{1}{4\pi} \epsilon \frac{\partial E}{\partial t}$ (ϵ = permittivity), the current in the conductor is σE (σ = conductivity) and the total current is linked with a magnetic field surrounding it in closed lines. The mathematical expression in $\text{curl } H =$

$$\frac{1}{4\pi} \epsilon \frac{\partial E}{\partial t} + \sigma E. \text{ These 2 equations are the}$$

vector forms of Maxwell's classical equations, on which is based the entire theory of electromagnetism from the design of electric machines to the propagation of electromagnetic waves (q.v.). The vector operators grad, div, curl, and their

combinations are powerful tools for solving problems in hydrodynamics, mechanics, electromagnetic theory, geometry of surfaces, potential theory, etc.

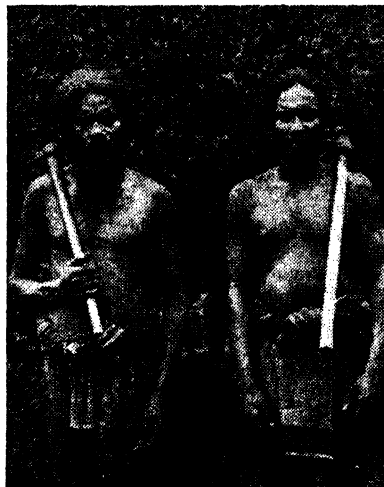
Vector Diagrams. In electrical engineering the relations between alternating currents and voltages in a circuit, assumed to be sine waves of the same frequency, may be represented in a diagram by 'vectors' drawn at the respective phase angles to one another. The 'vectors' are understood to rotate round their origin at const. speed and the varying ordinates to be plotted on a time-base, thus generating the sine waves. The method is founded on the fact that a sine wave generated by a line AB added to the sine wave generated by AC (at an angle behind AB) equals the sine wave generated by the vector sum $AB + AC$. See E. B. Wilson, *Vector Analysis: text book founded upon the lectures of J. W. Gibbs*, 1901-2; C. E. Weatherburn, *Vector Analysis* (elementary), 1921; (advanced), 1924; L. Silberstein, *Synopsis of Applicable Mathematics*, 1923; P. Kelland and P. G. Tait, *Introduction to Quaternions*, 1873.

Veda and Vedism. Veda is the general term for the ant. sacred literature of India, and Vedism is the early Aryan religion of India. The religious literature of India opens with 4 collections of hymns meant to be used at sacrifices. These are the Vedas proper, and the oldest of them is the *Rigveda*, which contains the poems from which the earliest information about the Aryans in India is derived. The other collections (*Samhitas*) of sacrificial hymns (*Mantras*) are the *Samaveda*, consisting of liturgical songs; the *Yajurveda*, consisting of sacrificial formulae; and the *Atharvaveda*; the last consists for the most part of charms and incantations, and is the prin. source of knowledge of the popular beliefs and superstitions of ant. India. See also SANSKRIT LANGUAGE AND LITERATURE.

Vedanta, Uttara-Mimamsa, or Upanishad, system of Brahminic philosophy which in its main features carries on the speculations of the older Upanishads; e.g. God is the sole real existence. He is both Creator and Nature, and all things are resolved in Him; the individual soul proceeds from Him and ultimately returns to Him; it is not a free agent, but is ruled by God, and its sufferings depend upon its bodily organs. See A. B. Keith, *The Religion and Philosophy of the Veda and Upanishads*, 1926; W. S. Urquhart, *The Vedanta and Modern Thought*, 1928; N. Macnicol (ed.), *Hindu Scriptures* (Everyman's Library), 1938; C. Isherwood (ed.), *Vedanta for the Western World*, 1948.

V.E.-Day, 8 May 1945, on which was celebrated the defeat of Germany in the Second World War, unconditional surrender having been signed at Rheims on the previous day. 'V' painted on walls, tapped out in Morse, and symbolised in the rhythm of the opening bars of Beethoven's fifth symphony had been adopted as a symbol of resistance to, and victory over, the Germans; 'E' stood for Europe.

Veddahs (or Veddahs), meaning 'hunters,' are regarded as the true aborigines of Ceylon and the last remnant of a race descended from the Yakkas (or Yakkos), a race of hunters whose ancestry dates back to the Stone Age, and who were probably immigrants, well over 2000 years ago, from pre-Dravidian India. Although the census of some years ago estimated the number of V. living in Ceylon at nearly 5000, they are fast dying out, and the Veddah pop., in the absence of reliable statistics, can be regarded as much less. It is thought that in the not too distant future they will cease to be a distinct ethnical group.



S. V. O. Sonnander

ROCK VEDDAHs

There are 3 types of V. in Ceylon, forming 3 distinct social groups, each composed of sev. clans. They are: (1) *The Wild or Rock Veddahs*. These dwell in caves or under shelter of overhanging rocks and forest trees in remote vils. (2) *The Coast Veddahs*. These live in the sea-board vils. between Batticaloa and Trincomalee, dwelling in mud-huts. (3) *The Village Veddahs*. These are intermediate between (1) and (2), and scattered over small areas in the neighbourhood of the Sinhalese and Tamils in the E. Uva and N.-Central Provs.

As a rule, the V. are about 5 ft tall, and can be distinguished by their dark, swarthy skin, long, black, shaggy hair, narrow skull, slightly prominent cheek-bones and other features. Their language consists of a limited range of guttural sounds, and though it is not quite comprehensible to the Sinhalese, it is supposed to be of Aryan origin. Some of the V., however, can speak Sinhalese or Tamil, or an

admixture of both. Their religion is a sort of demon-worship.

So merged is the Veddah tribe with the other races surrounding them that most of them are really half-V. at the present day.

Veen, Maerten van, see HEEMSKERK, MAERTEN JACOBZ.

Vega, Garcilaso de la, see GARCILASO.

Vega (α Lyrae) was the pole star of the 12th and 13th millenniums BC, and will attain the same position in the 15th and 16th AD. Draper photographed its spectrum in 1872. It belongs to that class of A stars, which are white stars, like Sirius, in which the spectral lines of hydrogen reach their greatest strength. The temp. of V. is about 11,000° C., and it is approaching the sun at about 10 m. per sec. Its magnitude is 0.1, parallax 0.13", and distance 26 light-years (see LYRA).

Vega Carpio, Lope Felix de (Lope de Vega) (1562-1635), Sp. poet and dramatist. b. Madrid. He took part in the expedition to the Azores in 1582, and also served in the Armada in 1588. He was secretary to the Duke of Alva and the Marquis of Malpica, and in 1613 took holy orders.

V. C. was held in high estimation in his own day, and his influence in Spain was as great as that of Voltaire in France. He was a voluminous writer, producing epics, pastorals, odes, sonnets, and novels; but it is to his dramatic works that he owes his eminent place in literary hist., and of these he wrote some 1500, of which 500 have come down to us. It was Lope de Vega who really created the Sp. romantic drama. The variety of his plays is extraordinary. Some of the best known are: *Los Ramilletes de Madrid*, *El Perro del Hortelano*; *La Viuda de Valencia*, *Las Flores de Don Juan*, *Estrella de Sevilla*, *Esclava de su Galan*, and *Alcade de Talamca*. Among his other works are the *Angelica*, an epic poem written in imitation of the *Orlando Furioso*; the *Arcadia*, a pastoral romance; *La Dorotea*, a masterly novel in dialogue form, imitating *La Celestina*; and *Dragontea*, an epic poem concerned with the hist. and death of Drake.

His plays were pub. in 25 vols. in 1604-47, and his miscellaneous works in 21 vols. in 1776-9. See lives by H. A. Kinnert and A. Castro, 1918, and J. de Entrambasaguas, 1942; also J. F. Kelly, *Lope de Vega and the Spanish Drama*, 1902; R. Schevill, *The Dramatic Art of Lope de Vega*, 1918; M. Menéndez y Pelayo, *Estudios sobre el teatro de L. de Vega* (6 vols., 1919-27); K. Vossler, *Lope de Vega und sein Zeitalter*, 1932; J. de Entrambasaguas, *Estudios sobre Lope de Vega*, 1946.

Vegetable Butters, see BUTTERS.

Vegetable Ivory, the seed of *Phytelphas macrocarpa*, the Ivory Nut Palm or Negro's Head, native of Colombia. When dried, the seeds can be carved and polished to simulate ivory.

Vegetable Marrow, fruit of an annual trailing gourd (*Cucurbita pepo ovifera*) much grown in cottage and other gardens

for use as a vegetable and for making preserves.

Vegetable Physiology, see PLANTS.

Vegetable Sponge, see LOOFAB.

Vegetable Wines, see WINES, HOME-MADE.

Vegetables, see COOKERY.

Vegetarianism, see FOOD AND DIET.

Vegilius, or **Flavius Vegetius Renatus** (fl. c. AD 400), Rom. writer, author of *Epitoma Rei Militaris* in 4 books. The material is chiefly borrowed from earlier authorities, and the style is worthless; But V. is the only extant source for much that his work contains. He also wrote *Digestorum artis mulomedicinae libri*, on veterinary medicine (ed. F. Lommatzsch, 1903). See C. Lang's ed. of the *Epitoma*, 1885).

Veglia, see KRK.

Vehmgerichte, see FEHMIO COURTS.

Veii, anc. city of Etruria, about 12 m. NNW. of Rome, and lying on a plateau near Isola Farnese. Until it was razed to the ground by Camillus after a 10-years' siege (396 BC), it was a dangerous rival of Rome.

Veiled Prophet, see AL-MOKANNA.

Veins, in anatomy, the blood vessels that carry the blood from the tissues to the heart. They are composed of 3 coats, *tunica adventitia*, *tunica media*, and *tunica intima*, and there is less muscular and elastic tissue than in arteries (q.v.). The V. are generally divided into 3 systems: the *general venous system*, the *pulmonary system*, and the *hepatic portal system*. The general venous system returns the blood from the greater part of the organism to the heart. The pulmonary system brings back the oxygenated blood from the lungs to the left ventricle of the heart. The hepatic portal system carries the blood from the stomach, intestines, spleen, and pancreas to the liver by the portal V., ramifying into numerous capillaries. The pulmonary and hepatic portal V. have no valves, but the general venous system has. The valves are so constructed as to prevent a reverse flow of blood. When these valves become incompetent varicose veins (q.v.) result. As a rule the course of the deeper veins is contiguous to that of the arteries.

Veins, Varicose, see under VARICOSE VEINS.

Vejle: 1. Amt in E. Jutland, Denmark. Agriculture, dairy farming, and cattle breeding is carried on. Area 905 sq. m.; pop. 207,880.

2. Cap. of the above, port on V. Fjord. It is an industrial centre, and manufs. machinery, hardware, textiles, leather, and soap. Pop. 30,760.

Vekhi (Russian 'landmarks'), symposium pub. in 1909 by a group of Russian philosophers and politicians (including Struve, Berdyaev, and Bulgakov, q.v.) which marked the emancipation of progressive Russian thought from the mystique of revolution. In the wider sense the name V. is applied to this whole trend of thought, most of whose leaders had been Marxists in the 1890s (see LEGAL MARXISTS), while others (see NOVOGROD-TSEV; TRUBITSKOY) had been Hegelians.

Both groups developed towards Idealism and Christianity under the influence of Dostoyevskiy and Vl. Solov'ev. See L. Schapiro, 'The *Vekhi* Group and the Mystique of Revolution' in *The Slavonic and E. European Review*, vol. xxxiv, No. 82, Dec. 1955.

Velasquez de Cuéllar, Diego (c. 1465-1523), Sp. administrator, b. Cuéllar. In 1511 he conquered Cuba, of which he was governor until his death, and in 1517 sent an expedition which discovered Yucatan. In 1518 V. sent Cortés to Mexico; later he regretted the wide powers given to the latter; Cortés in 1520 defeated a force sent against him by V.

Velathri, see VOLATERRAE.

Velázquez, Diego Rodríguez de Silva y (1599-1660), Sp. painter and one of the world's greatest artists, b. Seville, studied under Francisco Herrera (q.v.) and Francisco Pacheco (q.v.), whose daughter



Anderson

VELÁZQUEZ

Detail of the self-portrait from 'Las Meninas'.

he married in 1618. Summoned from Seville to Madrid by Count Olivares in 1623, he became Court Painter to Philip IV, and spent the rest of his life at Court (except for 2 journeys to Italy 1629-31 and 1649-51), painting many portraits of the royal family. His earliest work consisted of careful peasant studies ('The Cook' purchased by the National Gallery of Scotland in 1955 for £58,000, is an example). He then painted mythological subjects, but in the same realistic manner ('Los Borrachos'—the Topers—and the 'Forge of Vulcan'). Next comes his masterpiece of contemporary history 'Las Lanzas'—'The Surrender of Breda.'

(See SPAIN, History.) It was on his visit to Rome that he painted 2 views of the Villa Medici which have special place in the hist. of landscape. To his later period belong the masterpieces of group portraiture ('Las Meninas'—The Maids of Honour; 'Las Hilanderas'—the Tapestry Weavers); and the 'Venus and Cupid' called the Itokeby Venus, now in the National Gallery. His individual portraits, profound in humanity and masterly in design, are well represented in the 'Aesop' (Prado), 'Philip IV' (National Gallery). A great series of masterpieces are in the Prado, but as well as at the National Gallery there are fine works at Apsley House and in the Wallace Collection. V. has had a decisive effect on the course of European painting and beneficially influenced such later artists as Whistler and Manet. Murillo, Juan de Pareja, and Juan del Mazo were his pupils. See lives and studies by R. A. M. Stevenson, 1895; W. Armstrong, 1896; H. Stokes, 1901; A. de Beruete, 1906; R. Davies, 1914; E. V. Lucas, 1924; E. Harris, 1939. See also C. Justi, *Velázquez and his Times* (Eng. ed.), 1889; E. Lafuente, *The Paintings of Velázquez*, 1944.

Veld, Afrikaans (q.v.) word in common use throughout S. Africa and applied to any large plain. V. is applied generally to the great plateau lying to the W. of the Drakensberg Mts. Sheep thrive in this area, yielding high-quality wool. Maize is grown in abundance. Where irrigation is possible citrus fruit grows well. V. takes in the Karoo (q.v.).

Vélez de Guevara, see GUEVARA.

Vélez Málaga, Sp. tn in the prov. of Málaga, on the Vélez. It has large sugar-refineries, and a trade in wine. Pop. 11,000.

Velika Kikinda, see KIKINDA.

Veliki Beckerek, see ZRENJANIN.

Velikiy Novgorod, see NOVGOROD.

Velikiy Ustyug, tn in the Vologda Oblast of N. Russia, on the lt. Sukhona, 42 m. SW. of Kotlas. There is some industry (ships, hog bristles), and a famous silver craft is still carried on. Many 17th-19th-cent. architectural monuments may be seen. Known since the 12th cent., in the 16th and 17th cents. it was an important trading centre on the route to Archangel and Siberia. Pop. (1926) 19,000.

Velikiye Luki: 1. Oblast in Russia, W. of Moscow, largely lowland (Valday upland in the E.) and partly covered with mixed forests. There are lignite deposits. Area 17,300 sq. m.; pop. (1956) 658,000, mostly Russian. It has flax and dairy farming, lumbering, wood-working (prefabricated houses), and food industries. V.L. Oblast was abolished in 1958, and its ter. divided between the Pskov and Kalinin Oblasts.

2. Tn in the Pskov Oblast of Russia, on the Moscow-Riga railway. There is some industry, and it is an important railway junction. Pop. (1956) 53,000. It was founded in 1166, and was an important fortress and trading point of the Novgorod Rep. near the Lithuanian

frontier; it became Muscovite in 1478. It was the scene of bitter fighting in 1942-3, and was largely destroyed.

Velitrae, *see* VELLETRI.

Velleius Paterculus, *see* PATERCULUS.

Velletri (anc. Velitrae), It. tn, in Lazio (q.v.), in the Alban Hills (q.v.), 19 m. SE. of Rome. It has a 14th-cent. cathedral, and sev. fine anc. palaces. It was one of the Ger. strongholds in their defence of Rome in 1944, and was severely damaged (*see* ITALIAN FRONT, SECOND WORLD WAR CAMPAIGNS ON). There is a school of viticulture, and a trade in wine. Pop. (tn) 31,000; (com.) 34,927.

Vellum, the prepared skin of calves, lambs, and other animals, finer in quality than parchment, used for writing on since the 2nd cent. BC. *See also* MANUSCRIPTS; PARCHMENT.

Velobriga, *see* VIANA DO CASTELO.

determination of the V. of L. is threefold: in the first place the experimental determination of the V. of L. in air and in water provided a direct refutation of the corpuscular theory of light usually linked with the name of Newton; in the second place Maxwell discovered theoretically that electromagnetic waves (q.v.) travel through the ether with a velocity equal to that of light, and therefore identified electromagnetic waves and light waves. But the real philosophical importance of the V. of L. is due to the development of the Theory of Relativity (q.v.) which establishes the V. of L. in a vacuum as the greatest possible speed in nature, a speed that is an absolute constant; the V. of L. relative to all observers is the same. Three methods of measuring the V. of L. are especially interesting, viz.: (1) Römer's determination in 1673, the first

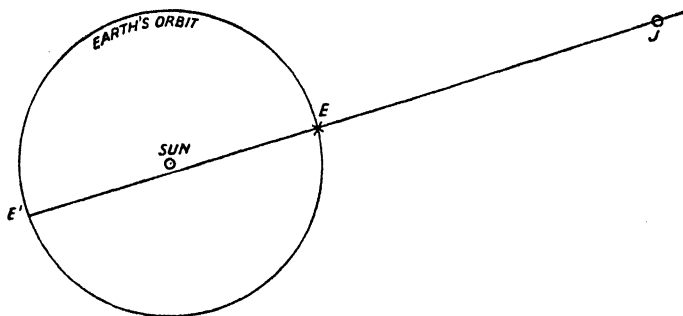


FIG. 1. RÖMER'S METHOD

Velocipede, *see* CYCLES AND CYCLING.

Velocity, rate of displacement of a moving point. It is sometimes applied to the rate at which a change of state or configuration may take place in bodies. To specify V. completely, the direction as well as the rate at which the body is moving must be given, and hence it is a vector quantity. To determine the V. of a body, the distance passed over by the body is divided by the time it takes. This gives the average V. over that distance. If the V. is not uniform the instantaneous V. is required, which necessitates the use of the differential calculus. The unit of V. is defined as that V. with which a moving point passes over unit distance in unit time, e.g. ft per sec., cm. per sec. (*See* MECHANICS; METROLOGY; VECTOR.)

Velocity of Light. Light travels through free space at the rate of 299,793.1 km. per sec., while its speed in air is only slightly less than this. The journey from the sun to the earth, a mean distance of approximately 93,000,000 m., occupies a ray of light for almost 500 sec.; in 1 sec. the light traverses a distance rather more than 7 times round the equator. The interest of the student of physics in the

determination ever made; (ii) Michelson's (q.v.) determination in 1931, much more accurate, giving the result of 299,796 km. per sec.; (iii) Essen's determination in 1950, using radio waves.

Römer's Method. The planet Jupiter has sev. moons, and as they revolve around it they sometimes pass behind it, as seen from the earth, so that they are eclipsed. The time of an eclipse for any moon can be deduced by astronomical calculations. Fig. 1. shows that if the eclipse of a moon occurs when the earth is at E, i.e. when Jupiter is in opposition to the sun, this 'light-signal' sent out from Jupiter will reach the earth earlier than in the case where the earth is at E', Jupiter being then in conjunction. Römer, by his observations, deduced the time taken for a light-signal to travel the distance EE', which is the diameter of the earth's orbit, a distance of 196,000,000 m. The result he obtained was 286,000 km. per sec.

Michelson's Method is really an improvement on the methods of Fizeau and Foucault. The idea may be understood from the apparatus he used in 1882. A beam of light from a source S (*see* Fig. 2) falls on a rapidly rotating prism while it is in the position AB. The light is focused

by a convex lens on the surface of a concave mirror M, whose centre of curvature is at the centre of the lens. The beam of light is therefore reflected as shown (the shaded beam), and it reaches the rotating prism, now at CD; it is reflected there and forms an image at S'. In this attempt the distance LM was about 2000 ft, while a turbine drove the prism at the rate of 256 revolutions per sec. By measuring SS', the V. of L. can be deduced from the other data. In 1931 Michelson made his final determination referred to above. The distance between the fixed mirror and the rotating prism was actually 22 m., the former being erected at Mt San Antonio, the latter at the Mt Wilson Observatory.

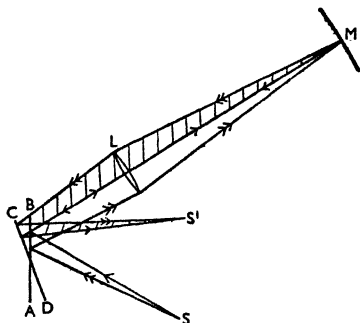


FIG. 2. MICHELSON'S METHOD

This enormous increase in the 'run' for the light was achieved by the design of a perfectly fashioned octagonal mirror, so that the image found was far brighter than when Michelson used a single mirror. Moreover, by adjusting the speed of rotation of the prism, Michelson arranged that the light set off on its 44-m. journey from one face of the prism and was received on its return by the succeeding face in exactly the same position occupied by its predecessor when the light set out. Thus the image S' was made to coincide with S and an inconvenient measurement was eliminated. See also MICHELSON-MORLEY EXPERIMENT.

Resonating-cavity Method. Strictly speaking this measures the velocity of radio waves, but the velocity of electromagnetic waves in free space is a constant independent of frequency, as is confirmed by the close agreement between the values from this and other methods. The resonant frequency of a metal cavity of accurately known dimensions is found with high precision. For a cavity about 7 in. long and a frequency of about 24,005,000,000 cycles per sec. Essen obtained the value $c = 299,792.6 \pm 0.7$ km. per sec. (1952). The latest value from refined optical methods is given by Edge (1956) as $299,792.4 \pm 0.11$ km. per sec.

Velour (Fr. velvet), fabric with a weft of mohair yarn, and linen and double cotton warps, used for hats and upholstery. It resembles felt, but has a pile akin to that of plush or velvet.

Velsen, tn in the prov. of N. Holland, Netherlands, on the N. Sea Canal. It is the entry harbour to Amsterdam. A tunnel to carry road and rail traffic under the Canal was opened in 1957. Main manufs. are chemicals, paper, and iron, and there is shipbuilding. Pop. 56,400.

Velvet (Lat. *villosa* and Fr. *velours*), fabric believed to have originated in the E., possibly in China, but known at least as early as the 13th cent. V. is made of pure silk, its surface being a short, thick pile, produced by weaving a second set of warp thread over the already woven cloth, these threads being passed over wires and cut before the wires are removed. A similar material with a cotton back and silken face is termed velveteen, but with the development of synthetic materials the term V. is indiscriminately used in conjunction with the basic fabric from which it is made, such as rayon V., cotton V., etc. Up to the 16th cent. the finest V.s were woven on the looms of Genoa, Venice, and Florence. The craft was brought to London by Fr. Protestant refugees. Today Krefeld and Lyons are 2 important producing centres.

Ven, Hven, or Hveen, is. of Sweden, situated in the Sound, 5 m. NW. of Landskrona. Tycho Brahe lived here in his observatory until 1577.

Venado Tuerto, tn of Argentina in the prov. of Santa Fé, 230 m. from Buenos Aires on Bartolomé Mitre Railway. There are large estancias in the vicinity; meat packing and agriculture are carried on. Pop. 16,500.

Venda, a Bantu-speaking tribe of the Transvaal, S. Africa. Their origin is unknown, and they are famed for their elaborate kingship. The king is sacred, or semi-divine, and before his death confers godhead upon himself by the performance of a solemn and solitary dance. To-day they number about 130,000 in the Soutpansberg district. See H. A. Stayt, *The BaVenda*, 1931.

Vendace, see COREGONUS.

Vendée, La, maritime dept of W. France, formed of part of the anct prov. of Poitou (q.v.). The Bocage Vendéen (see BOCAGE) is the main part of the dept, but there are marshes in the NW., and a well-cultivated plain in the S. Agric. is the main occupation, the prin. crops being wheat and sugar-beet. The vine is widely cultivated, and horses and cattle are bred. Fishing is important to the coastal vils., and there are a few minor coalfields in the centre. The prin. tns are La-Roche-sur-Yon (the cap.), Fontenay-le-Comte, and Les-Sables-d'Olonne. In the year 1793 a Royalist rising took place in La V., touched off by the Republican gov.'s introduction of conscription. The rebels gained initial military successes, but were finally checked at Cholet in Oct., and the revolt was stamped out by a decisive defeat at Savenay (Dec.). For a short

time it had appeared to threaten the existence of the Rep. Area 2690 sq. m.; pop. 395,650.

Vendémiaire (Lat. *vindemia*, vintage), the first month of the year in the Fr. revolutionary calendar, *see* CALENDAR.

Venden, *see* WENDEN.

Vendetta, modern survival of the custom of blood feud by which fellow-kinsmen were bound to take vengeance for any personal injury done to a member of their clan or family. The V. is narrower than the old blood feud in that vengeance is exacted only in the single case of a murdered relative. The V. exists or did exist until recently in Corsica and in parts of Sardinia and Sicily. *See also* BLOOD VENGEANCE.



Satur Photograph

VENDA TRIBE OF NORTH TRANSVAAL

Vendôme, Duke of, *see* ANTOINE.

Vendôme, Louis Joseph, Duke of (1654-1712), marshal of France, b. Paris, son of Louis, 2nd Duke of V., and great-grandson of Henry IV. He first saw service in the Dutch campaign of 1672, and in the war of the Grand Alliance served with distinction. In 1702 he was placed in command of the Franco-Sp. army in Italy, fighting 2 indecisive battles against Prince Eugene and overthrowing the Austrians at Calcinato (1706). He was defeated by Marlborough at Oudenarde in 1708, and relieved of his command. He won further victories in Spain in 1710,

however. V. was one of the greatest of Fr. gens. and exercised an enormous influence over his men. *See* life by the Marquis de Segur, 1913.

Vendôme, Fr. tn, cap. of an arron., in the dept of Loir-et-Cher, on the Loir. The anct church of the Trinity has a magnificent 12th-cent. belfry, 255 ft high. On a hill above the tn is the ruined castle of the counts of V. Gloves and paper are manuf., and noted cheese and asparagus are produced. Pop. 10,300.

Vendors and Purchasers. The law concerning contracts for the sale of land, and especially their specific enforcement in the Chancery Courts (as to which *see* SPECIFIC PERFORMANCE), is commonly referred to as the law of V. and P.; though, of course, personal property can equally form the subject of such a contract. Contracts for the sale of interests in land are, however, so intricate and technical (though to a less degree since the passing of the Law of Property Act, 1925), that it is always desirable in negotiating for sale or purchase to employ solicitors. (As to the form of such a contract, *see* CONTRACT; FRAUDS, STATUTE OF.) No contract for the sale of land will stand unless: (1) It is quite clear what the subject-matter of the contract is. In this connection if the subject-matter can be ascertained, mere uncertainty as to the exact measurements will not of necessity invalidate the contract. (2) The price is fixed. A contract for sale 'at a fair valuation' is enforceable; but if the mode of valuation be specified in the contract the court will not decree specific performance until the price has been ascertained by the means so specified. (3) All other essential terms are included. All the court requires is that the agreement contains the necessary terms upon which to base a formal conveyance; hence the omission of trifling details is immaterial. Where it is contracted to sell in addition to land (q.v.) the goodwill (q.v.) of a business, it is essential to specify the time for completion of the sale. The duties of a vendor are: (1) To show and make a good title to the land in accordance with the contract. The 'abstract of title' (i.e. the hist. of the title showing the successive steps in its transfer) must go beyond 30 years where necessary to arrive at a root of title, i.e. a point at which it can properly begin. The best root of title is a mortgage or purchase deed, as such a document leads to the inference that at the time of the execution thereof the title must have been investigated and in the case of a purchase deed the seisin (q.v.) of the possessor in title is shown. A general devise by will or a disentailing deed is not a proper root of title. (2) To enter into covenants with the purchaser. The most important are: (a) that he has a right to convey the land; (b) that the purchaser shall have quiet enjoyment of the land; (c) that the land is free from encumbrances; (d) that he will make all 'further assurances' (i.e. conveyances) that may be necessary; and in the case of sale of leasehold (e) that the lease is valid and the rent paid. (3) To

execute a proper deed of conveyance (q.v.) on the payment of the purchase money. It is for the vendor to bear the cost of supplying a proper abstract of title, and he must also bear the expense of getting in all outstanding estates (q.v.) (including outstanding legal estates) and paying off encumbrances and stamping all title-deeds. In the absence of express provision to the contrary the purchaser prepares and pays for the preparation and stamping of the deed of conveyance, though the vendor pays the cost of *perusal*. (4) To deliver to the purchaser all title-deeds in his possession or control. The duties of the purchaser are: (1) to peruse the abstract of title and make all his objections to it in reasonable time; (2) to prepare the deed of conveyance and deliver it to the vendor for execution; (3) on completion to pay the purchase money, or, if a deposit has been paid (as is usual by way of guarantee of good faith), the residue of the purchase money, together with any interest due for delay; and (4) to enter into possession of the land so as to relieve the vendor from any further liability incident to ownership. Breach of contract by the purchaser entitles the vendor either: (1) to bring an action for specific performance and join with the claim a claim for damages (q.v.); or (2) to sue at common law for the price; or (3) to take out a summons (a summary remedy available only to decide questions as to title); or (4) to sue at common law for damages; or (5) to enforce his lien (q.v.); or (6) to resell and recover any difference in price from the purchaser; or (7) to sue for rescission. The purchaser has remedies corresponding to (1), (3), and (4) above; he may also sue: (1) for rescission of the contract, adding a claim for the return of any purchase money paid; (2) to enforce his lien by claiming a declaration of his right thereto and an order for sale.

The law of V. and P. was considerably changed by the Law of Property Act, 1925, which came into force on 1 Jan. 1926. This Act introduced a new system of making titles to land (*see CONVEYANCING*) and, generally, revolutionised the law of real property, though many of the topics or branches of the law of V. and P., e.g. the contract of sale, specific performance (q.v.), etc., are not materially affected. The underlying principle of the new system, in relation to V. and P., is to extend the doctrine of 'purchase for value without notice', or, in other words, to keep the equities off the legal estate. The Act of 1925 provides a method by which the vendor can prove a legal title to the legal estate alone, and the purchaser is protected from equitable interests even if he has notice. Where a conveyance of the legal estate to a purchaser is made, the purchaser will take the land free from equitable interests, even if he has notice of them, in the following cases: (1) if the land is sold by a tenant-for-life or otherwise under the powers of a settlement (q.v.) the purchaser takes free from all the equitable interests of persons entitled under the settlement, but not

from such equitable interests as restrictive covenants and equitable easements which existed prior to the settlement; (2) if the land is sold by trustees under a trust for sale the purchaser takes free from all equitable interests of persons entitled to the proceeds under the document creating the trust and, if the trustees are appointed by the court or are a trust corporation (*see TRUSTS AND TRUSTEES*), the purchaser takes free from interests having priority to the trust for sale; but not from certain other interests, if he has notice of them, viz. interests protected by a deposit of deeds, restrictive covenants, easements, contracts to sell legal estate, etc.; (3) if the land is sold by a mortgagor the purchaser takes free from the equity of redemption; (4) if the land is sold by a personal representative of a deceased owner the purchaser takes free from the claims of persons interested in the estate of the deceased; and (5) if the land is sold under order of the court the purchaser takes free from the interests of all persons who are parties to the action. It is to be noted that the Act of 1925 does not give the purchaser protection against equitable charges, etc., protected by deposit of the title deeds of the legal estate; nor against any interest of a person in land of which he is in actual possession. *See H. Seaborne, Law of Vendors and Purchasers of Real and Leasehold Property* (9th ed.), 1928 (supplement), 1929; J. H. Dart, *Vendors and Purchasers* (2 vols., 8th ed.), 1929; T. C. Williams and J. M. Lightwood, *Vendor and Purchaser of Real Estate and Chattels Real* (2 vols., 4th ed.), 1936; Sir C. Brickdale and Sir J. S. Stewart-Wallace, *Land Registration Act, 1925* (4th ed.), 1939; E. O. Walford, *Conditions of Sale of Land, 1940*; Sir L. H. Elphinstone, *Covenants Affecting Land*, 1946; T. C. Williams, *Contract of Sale of Land*, 1948 (with supplement, 1953); A. Gibson, *Conveyancing* (16th ed.), 1950; L. E. Emmet, *Notes on Perusing Titles and on Practical Conveyancing* (14th revised ed.), 1955.

Veneering, gluing of a thin sheet or sheets of ornamental wood over a foundation of inferior wood. V. is much practised in furniture making, and is the most popular and least expensive means of forming a decorative surface on plywood (q.v.) boarding. In good V., only the best plywood is employed, since the final polished surface would show any minor defects that cheaper plywood might possess. The best results are obtained when the veneers are of double thickness. A good straight-grained veneer is laid on the outer ply of the board with the grain at right angles to the grain of the ply, and the finishing figured veneer is then laid on this with its grain following the grain of the outer lamination of the ply board. Counter veneers, of similar substance and strength to the veneers laid on the face, are laid on the back of the ply to prevent the whole from being pulled out of its true plane. *See Edward Kitson, Marquetry and Veneers*, 1952.

Venema (or **Venemas**), Hermann (1697-1787). Dutch prof. of theology at Franeker. He was author of the *Institutes of Theology* (trans. 1850), and of commentaries on Daniel, 1752, Malachi, 1759, the Psalms, 1762-7.

Vener, Lake, see **VANERN**.

Veneral Diseases (from Lat. *Venus*, *Veneris*, the Goddess of Love), nowadays frequently abbreviated to *V. D.*; is so called because these diseases are usually acquired during sexual intercourse. Such a mode of infection is probably invariable in the case of *gonorrhoea* (q.v.) of adults, but a child can become infected in the eyes from the genital passage of the mother during birth. *Syphilis* (q.v.) is occasionally transmitted by other means, e.g. by kissing an infected person; it can also be acquired by the foetus (unborn child) *in utero*, but it is not strictly speaking inherited. These two, which are the only *V. D.* of importance in Great Britain, are dealt with in separate articles, though it may be added here that the treatment of gonorrhoea, and to a certain extent of syphilis also, has been improved and shortened by the use of penicillin. In the Second World War, as always during war-time, the incidence of *V. D.* increased, and a publicity campaign was undertaken by the gov. to warn the public of the dangers. Regulation 33B (1939) prescribed that any person named as a source of contact of *V. D.* by 2 patients should be compelled to attend for treatment; lectures and prophylactic treatment were given in the Armed Forces. There are arguments both for and against the inclusion of *V. D.* in the list of notifiable diseases. Notification is compulsory in some countries (e.g. all 48 states of the U.S.A.), but not in Great Britain. See R. R. Wilcox, *A Textbook of Venereal Diseases*, 1950.

Venesection, or **Phlebotomy**, cutting of a vein in order to let blood. *V.*, together with other methods, such as cupping and leeching, was the chief remedial measure of medieval physicians. The underlying idea was the elimination of the morbid 'humours' causing disease. In modern practice it is sometimes employed in conditions where the blood-pressure needs to be reduced or in congestive heart failure.

Venetl, see **VANNES**.

Venetl: 1. Gallic tribe who dwelt in what is now the Morbihan dept of France. Essentially sea-traders, and with a prosperous agriculture, they carried on a considerable trade with Britain. They resisted Caesar's forces, but were defeated in a naval battle in 57 BC. Under the Empire their trade declined.

2. People who dwelt in the area round the headwaters of the Adriatic, to which they had migrated about the mid-10th cent. BC. At that time they were an Illyrian-speaking people. Civilised and peaceful, they preferred commerce to war, were prominent in the amber trade and famous for their horse-breeding. Friendly towards Rome, they fought for her against the Gauls and against Hannibal. Later they became subject to Rome, were romanised before the end of

the rep., and under Augustus their ter. became part of the 10th region of Italy. They enjoyed prosperity until the end of the 2nd cent. AD, but later they were attacked in turn by the Alemanni (286), the Goths (c. 400), and the Huns (452). After the last attack many of them took refuge in the ls. off their coast, on which Venice now stands.

Veneto, region (*compartimento*) of NE. Italy, comprising the provs. of Belluno, Padua, Rovigo, Treviso, Venice, Verona, and Vicenza (qq.v.). It is bounded N. by Austria, W. by Lombardy and Trentino-Alto Adige, S. by Emilia-Romagna, and E. by the Gulf of Venice and Friuli-Venezia Giulia (qq.v.). The N. is in the Alps (q.v.), and contains part of the Dolomites (q.v.); the S. is in the Plain of Lombardy, and is watered by the Po and the Adige (qq.v.). Cereals, rice, wine, tobacco, sugar-beet, and vegetables are produced, marble is quarried, and there are textile, glass (Venice), brick, sugar, iron, aluminium, leather, and ship-building industries. The chief tn is Venice. Area 7098 sq. m.; pop. 3,911,000. See **VENEZIA EUGANEA**.

Venezia, see **VENICE**.

Venezia Euganea, former name of a dist. of NE. Italy, comprising the present region of Veneto (q.v.) and the present prov. of Udine (q.v.).

Venezia Giulia e Zara, name of a former region of NE. Italy, which comprised the provs. of Carnaro, Gorizia, Istria, Trieste, and Zara (area 3456 sq. m.). At the end of the Second World War, by the peace treaty signed in Paris on 10 Feb. 1947, the greater part of the region was ceded to Yugoslavia, Italy retaining 180 sq. m. now incorporated in Friuli-Venezia Giulia (q.v.). See **TRIESTE**.

Venezia Tridentina, see **TRENTINO-ALTO ADIGE**.

Veneziano, Agostino, Venetian engraver of the early 16th cent. He was a pupil and assistant of Marcantonio Raimondi, and engraved many works, chiefly after Raphael. A fine collection of his works is preserved in the Brit. Museum.

Venezuela (*Estados Unidos di Venezuela*), S. Amer. rep. occupying the whole of the lower basin of the R. Orinoco and the coastal plain surrounding the Gulf of Maracaibo, with a sea coast just within the Caribbean Sea and therefore facing the W. Indian Is. E. of Cuba and Jamaica. The average sea-level temp. varies from 75° to 85° F., but like other tropical countries, the range of climate coincides with elevation. Where ocean winds penetrate, the region is healthy, otherwise malaria and other fevers are common. In the E. lies Brit. Guiana; W., Colombia; S., Brazil. The first portion of the mainland to be sighted by Columbus, it fell to the Spaniards, and its hist. is connected with the piracy and slave trade of the Sp. Main.

Physical Features. The valley between the maritime Andes and the Sierra Nevada de Mérida is the most densely peopled part of the state. E. and S. of this lies a densely wooded, thinly peopled, and largely unknown mountainous region,

separated from the Orinoco by llanos (grassy plains, or prairies), with wooded portions here and there. The mts of the central highlands rise sharply from the coast to heights of 7000-9000 ft. The dry conditions are restricted to the first few hundred ft of the mt slopes. Above that an abundant rainfall supports a cover of forest which continues to the tree line between 6000-7000 ft above sea-level. In the vicinity of Mérida are 5 snow-capped peaks, about 16,000 ft in altitude. The Sierra Nevada de Mérida is the chief coffee-providing region of V. The llanos are uniformly level and largely flooded during the rainy season; the delta and borders of British Guiana are thickly forested and inhabited only by scattered Indian tribes. The pastures of the Valencia region have been long used for the fattening of cattle from the llanos. The savanna varies from tall bunch grasses which grow in the drier parts to the short grass of the wet spots. The Orinoco is navigable for large steamers for 260 m. to Ciudad Bolívar, the centre of the riv. trade, a place of 41,000 inhab., with steamer connection with Trinidad. Navigation varies greatly, the riv. being much lower in the dry season. Altogether there are some 11,000 m. of navigable water in V.

Political Divisions, Population, and Area. The country is divided into a federal dist., 20 states, and 2 ters. with a total pop. according to the 1950 census of 5,030,000. The chief tns are: Caracas (cap. and federal dist.); Barquisimeto; Maracaibo; Valencia; San Cristóbal; Puerto Cabello; Maracay; Carúpano; Ciudad Bolívar; and La Guaira (the prin. port of V.). Of the pop. 10 per cent are white, chiefly of Sp. descent; 70 per cent mestizos, probably the largest proportion in any of the S. Amer. states; the remainder Indians, Negroes, and foreigners. Europeans are concentrated in the large tns. Pure Indians survive only in the more remote places—the Guiana highlands, S. of the Orinoco or in the forests W. of Maracaibo. The Negro mixture is greatest along the Caribbean coast, in such parts as La Guaira and Puerto Cabello.

The states have separate legislative assemblies and constitutions, with a president; they are divided into dists. and municipalities. The Federal dist. and the ters. are administered by the president through governors. The area of V. is approximately 352,140 sq. m., four-fifths of which forms part of the basin of the Orinoco.

Constitution and Government. In 1830 V. seceded from the rep. of Colombia, and its present constitution dates from 5 July, 1947 and the Electoral Statute of April 1951. Congress consists of 2 chambers, a senate of 40 members, and a chamber of 98 deputies, elected for 5 years by universal adult suffrage. Senators must be Venezuelans by birth and over 30 years of age. Deputies must also be native Venezuelans and over 21 years of age; there is 1 deputy for every 40,000 inhab. and 1 more for an excess of 20,000,

and a state with fewer than 35,000 pop. has 1 deputy. The 2 ters., on reaching the pop. fixed by law, also elect deputies. The president is elected by universal secret ballot for 5 years, must be a Venezuelan by birth, over 30 years of age, and cannot succeed himself. He exercises executive power in conjunction with the cabinet ministers, through whom he acts, and has a modified power of veto. This in effect means that his veto may be overridden by a two-thirds vote of both chambers, and if he considers an Act to be unconstitutional he may submit it directly to the Supreme Court for a decision.

Production. The surface of V. comprises 3 well-marked zones—the agric., the pastoral, and the forest. In the first are grown coffee (nearly 540,000 ac.), cocoa (13,000 plantations), wheat, rice, tobacco, cotton, maize, sugar-cane (about 18,000 plantations); the second is given over to stock-raising; and the third, which covers half the country, produces caoutchouc, balata (a kind of gum somewhat like rubber), copaiba, vanilla, etc.; but the forest resources are scarcely tapped. Over one-fifth of the people are engaged in agriculture or in cattle-raising. There are 4,000,000 oxen in V., 1,333,000 goats and more than 350,000 pigs. V. is the second largest petroleum-producing country in the world. The oil concessions cover over 13,500,000 ac., and oil accounts for 90 per cent of total exports. The output has increased from 19,000,000 barrels in 1925 to over 2,000,000 barrels daily in 1954, and in the latter year export of petroleum and by-products amounted to over \$1,500m. The basin of Lake Maracaibo is the most prolific S. Amer. source of oil. There is another oilfield in eastern V., in the states of Anzoátegui and Monagas and the ter. of Delta Amacuro. Other minerals are gold (found near Ciudad Bolívar), copper ore, magnesite, coal (obtained in the vicinity of Coro, and Naricual), iron, sulphur, and salt. Iron is obtained in the Imataca Mts and the delta, and the war-time discovery of the 'Iron Mountain' of Cerro Bolívar has added a steel project to the already thriving industrialisation touched off by the oil boom. At this site, at the junction of the Orinoco and Caroní rvs., a new port (San Félix) and an airport (Porto Ordaz) have been built. Coal and petroleum are sought chiefly in the regions of Lake Maracaibo and the R. Guasare. Pearl-fishing flourishes, especially around the is. of Margarita. There are but few secondary industries beyond cotton textiles of a cheap quality produced at Valencia and Caracas. Salt and matches are gov. monopolies. There are cement factories at Valencia, Barquisimeto, and Caracas, and a glass factory at Caracas. Imports and exports have thriven in recent years, and in 1954 were £605m. and £293m. respectively; the deficit is more than made good by oil royalties. On 30 June 1930 V. paid off its entire external debt of 23,750,000 bolívares in gold, as a token of homage to Simón Bolívar, the Liberator. The

official monetary unit is the bolívar, normally equal to 0.290323 gramme fine gold or 32.67 cents U.S.

Communications. La Guaira is the chief port. There are 11 main railway lines, which own together over 640 m. of railways. There are wireless stations at Caracas, Cristóbal, Barquisimeto, and in a number of other tns. There are some 10,000 m. of road. The excellent inland and international air services are government-owned. Malquetia is the airport for Caracas.

Religion and Education. The Rom. Catholic is the prevailing religion of V. There are 2 archbishops, one at Caracas and the other at Mérida. There are also 8 suffragan bishops. Elementary instruction is free and from the age of 7 compulsory. The univs. are those of Los Andes at Mérida with 2000 students and the Central Univ. at Caracas (300 years old) with over 1600 students, and that of Zulia (Maracaibo) with some 1200. A Workers' Univ. in Caracas was set up by a law of 9 Oct. 1947.

Defence. By a law of 1942 all males who have reached the age of 18 must serve in the active military forces for periods ranging from 1 to 3 years. All serve in the reserve afterwards until the age of 45. The active army has an estab. of 10,000 men of all ranks and consists of 8 infantry brigades, a corps of artillery, engineers, and other ancillaries, and also aviation services.

History. V. was first sighted by Columbus in 1498, and in the following year visited by Alonso de Ojeda and Amerigo Vespucci. The country remained under Sp. rule until the revolution under Simón Bolívar (q.v.), when its independence was won at the battles of Lagunillas (1813) and Carabobo (1821). V. was part of the Federal Rep. of Colombia until 1830, but thereafter became absolutely independent. There have been a number of revolutions since 1846, and in 1864 the country was divided by President Falcón into states and formed into a Federal rep. Between 1830 and 1935, V. had more than a dozen rulers, but 3 were pre-eminent: Páez, the half-Indian peon, who declared the independence of V. in 1830; Guzmán Blanco, who assumed office in 1870; and Juan Vicente Gómez (1909-35). Under each of these despots V. was ruled as a private estate for the benefit of the owner, but the result was the estab. of order among the different factions and a consequent increase of material prosperity. On the dispute between Great Britain and the U.S.A., over the Venezuelan-British Guiana boundary, see ARBITRATION, *A. between Great Britain and the U.S.A.*; CLEVELAND, STEPHEN GROVER; and UNITED STATES, *History*. In Oct. 1945 a revolt broke out against the Conservative gov. of Gen. Medina, who had been elected president for 5 years from 1941. The leader of the revolt, Rómulo Betancourt, assumed the presidency after a struggle of only 3 days and the new gov. was soon recognised by America, Britain, and France. A year later an elected constituent assembly drew up a new

constitution, providing for a federal rep. of 20 autonomous states, a federal dist. and 2 ters. The general election of Oct. 1946 was the first that had been held since 1881. He in turn was succeeded by a military junta under Delgado Chaband in Nov. 1948 and the Chief of Staff, Lt.-Col. Carlos Pérez Jiménez, was elected President, and re-elected in 1952. In Jan. 1958 General Pérez Jiménez was overthrown by a military junta led by Rear-Admiral Wolfgang Larrazabal, following on a general strike organised by a civilian body which resulted in the outbreak of fighting. Jiménez fled to the Dominican Rep., and General Perón (q.v.), the former president of Argentina to whom Jiménez had given asylum, left for Colombia.

See J. M. Spence, *The Land of Bolívar*, 1878; T. C. Dawson, *The South American Republics*, 1905; A. H. Keane, *Central and South America*, 1909; L. V. Dalton, *Venezuela*, 1912; C. R. Enock, *The Republics of Central and South America*, 1913 (2nd ed., 1922); P. L. Boll, *Venezuela* (Washington), 1922; L. M. Nesbitt, *Desolate Marches: Travels in the Orinoco Llanos of Venezuela*, 1935; E. Ferguson, *Venezuela* (New York), 1939; N. Roosevelt, *Venezuela's Place in the Sun* (New York), 1940; L. Alvarado, *Datos Etnográficos de Venezuela* (Caracas), 1945; R. S. Scrivener, *Venezuela, August 1954*, H.M.S.O. (Overseas Econ. Surveys), 1955.

'*Veni Creator Spiritus*' ('Come, Holy Ghost') an early and very famous hymn for Pentecost, probably written by Hrabanus Maurus (776-856). The trans. in the Anglican Prayer Book ordination service is by Bishop Cosyn.

Venice (It. Venezia): 1. Prov. of Italy. In E. Veneto (q.v.). It is generally plainland, lying along the Gulf of V. The coast-line is greatly indented, and contains numerous lagoons, including the famous lagoon on which the city of V. stands. There are sev. rivs., of which the most important is the Piave (q.v.). Cereals, salt, rice, and fish are produced. The prin. tns include V., Mestre, Portogruaro, and Chioggia (qq.v.). Area 950 sq. m.; pop. 745,000.

2. It. city and seaport, cap. of the prov. of V., and chief tn of Veneto, on the Gulf of V., 240 m. N. of Rome (q.v.). It is the H.Q. of one of the It. naval defence zones. The city is built on a large number of small is., divided into 2 groups by the Grand Canal (q.v.), which runs NW.-SE. and forms the main thoroughfare. This canal (in shape an inverted S) is crossed by 3 bridges (from N. to S.: Stazzone, Rialto, Accademia), and from it branch about 150 smaller canals. There is no wheeled traffic in the city, and transport is traditionally by means of the boat known as the 'Gondola' (q.v.). The is. of *la Giudecca* is separated from the city proper by a waterway called the Canale della Giudecca. A railway viaduct 2½ m. long connects the city to suburbs on the mainland (see MESTRE), and there are other suburbs on the long narrow is. on the outer edge of the lagoon (see LIDO). The centre of V. is the wonderful square of St Mark, which is surrounded by many

of the prin. buildings of the city: the 5-domed cathedral of St Mark (1063-94), with its marbles and mosaics and the 4 great bronze horses (Gk, 3rd or 4th cent. bc), is one of the most splendid Byzantine buildings in the world; the palace of the Doge (q.v.) is a Gothic structure of the 14th-15th cents., and is connected to the State Prison by the covered Bridge of Sighs (q.v.); the Campanile is a reconstruction of a tower which collapsed in 1902, but the Loggetta adjoining it is by Sansovino (q.v.); the Torre dell'Orologio, with its bronze figures to strike the hours, dates from 1496; and the Museo Civico has a notable collection of antiquities. On the quay S. of the cathedral stands the famous column bearing the 6th-cent. bronze lion of St Mark. There are many fine churches, most of them richly decorated and containing remarkable paintings, among them Sta Maria della Salute, Sta Maria Gloriosa, and S. Salvatore. There are sev. important libraries, and the Galleria dell'Accademia has a representative collection of works by Venetian painters (see ITALIAN ART). In addition to its great schools of painters, the contribution of V. to the arts has been very considerable. Its masons, mosaicists, and glass-workers have been famous since early times, and in the 15th cent. the printing-presses of V. produced more books than those of Rome, Milan, Florence, and Naples combined. The blown-glass industry still flourishes (see MURANO), and there are textile, jewellery, lace, and publishing industries. At the new suburb of Porto Marghera, on the mainland, there are iron, steel, zinc, and other industries. Pop. (city) 204,500; (com.) 323,200.

History. The hist. of V. begins with the inhab. of the plain at the head of the Adriatic taking refuge in the lagoons from the incursions of the Barbarians. At first the is. of the lagoons were only a temporary refuge, and although steps were taken towards a corporate existence in 466, it was not until 568 that the refugees abandoned the idea of a return to the mainland. Of the original 12 townships Rialto, now V., was not the most important. The tn became known as the Rep. of St Mark after the saint's bones were brought there in 828. It grew into the most powerful of the It. states, trading with the Far E. and distributing its imports throughout W. Europe. Colonies and factories were founded in the Morea, at Constantinople, and in many of the coast tns of Syria. By the end of the 15th cent. V. ruled also Istria and Dalmatia, Ravenna, and parts of Lombardy and Apulia (qq.v.). From the beginning of the 14th cent. its gov. was an oligarchy headed by the Doge, and it had to maintain its supremacy in the Adriatic against its rival Genoa (q.v.), and against the Empire, the Turks, and the Dalmatian pirates. It took a leading part in the transport of soldiers to the Holy Land during the Crusades (q.v.). In the latter half of the 15th cent. the decline of the Rep. began; the chief causes were the Turkish conquest of

Constantinople, the discovery of the Cape route and of America, and the rise of the great European Powers and their dominance in Italy generally. The end finally came with the destruction of the Rep. by Napoleon I (q.v.) and the handing over of the city to Austria by the treaty of Campo Formio (q.v.) in 1797. In 1866, after the war between Prussia and Austria (see AUSTRIA, History), V. passed to Italy. During the Second World War the city escaped serious damage.

See J. Ruskin, *Stones of Venice*; E. V. Lucas, *A Wanderer in Venice*, 1930; T. Oker, *Venice and its Story*, 1930; F. Schillmann, *Venedig Geschichte und Kultur Venetiens*, 1933; H. Tietze, *The Drawings of the Venetian Painters*, 1944; A. Stokes, *Venice: An Aspect of Art*, 1945.

Venice, Gulf of, name given to the N. part of the Adriatic Sea (q.v.), bounded by the coasts of Istria, Friuli-Venezia Giulia, and Veneto (qq.v.). The prin. tns on its shores are Venice and Trieste (qq.v.); the indentation on which the latter tn stands is also called the Gulf of Trieste.

Venizelos, Eleutherios (1864-1936), Gk statesman, b. Canea, Crete. He became Gk Premier in 1910 (he had already made his name politically in Cretan affairs), having saved the dynasty during the Balkan crisis of 1909-10 by his masterly revision of the Constitution and co-operation in forming the Balkan Alliance of 1912. At the outset of the First World War he advocated Gk intervention on the side of the Entente, but received no support from King Constantine and resigned in 1915. Towards the end of 1916 V. set up a provisional revolutionary gov. at Salonika. Late in 1917 he returned to Athens, being recalled to office, after the abdication of Constantine, by King Alexander. He was now head of the National Gov. and contributed to the efficiency and success of the Allied army at Salonika, reorganising the Hellenic forces. But the failure of the Greeks in the war with Turkey in 1921-2 embittered sentiment towards him. After the revolution in Greece in 1922, however, he represented his country at the Lausanne Conference and in 1924 once more became Prime Minister, the country having meanwhile become a rep. From 1928 to 1932, following a dictatorship, he was again in power; in Crete he inspired a revolt against its acting regent, but the revolt was quelled and he was forced to go into exile in France, where he d. See lives by V. J. Seligman, 1920; S. B. Chester, 1921; H. A. Gibbons, 1921.

Venlo, tn and important railway junction in the prov. of Limburg, Netherlands, on the R. Maas. It was once a strongly fortified tn. Industries include engineering, and the manuf. of tobacco, paper, and electric lamps. V. was the scene of heavy fighting late in the Second World War (see WESTERN FRONT in SECOND WORLD WAR). Pop. 49,438.

Venomous bites and stings. Some snakes are provided with poison-glands connected with grooved fangs. One lizard, the heloderm of N. America, has

poison-glands. Centipedes have poison-sacs connected with the jaws. Spiders paralyse their prey by stabbing with poison-claws, and scorpions have a sting or telson at the end of the 'tail' (abdomen). For first-aid treatment in snake bite the wound should be enlarged and suction applied; an injection of antivenine should be given if available. The adder (viper) is the only poisonous snake in Great Britain. *See also* INSECT BITES AND STINGS.

Venosa (ancient *Venusia*), It. tn in Basilicata (q.v.), 23 m. N. of Potenza (q.v.). It has a 15th-cent. cathedral, and has a large trade in agric. produce. Horace (q.v.) was b. here. Pop. 13,400.

Ventilation, the replacement of stale air by fresh. People differ widely in what they consider to be stale air, and it is difficult to lay down standards. Generally, V. should be designed to remove smell, smoke, noxious gases, or dusts before they cause discomfort or injury to health; in hot weather it may need also to supply a current of fresh air to promote evaporation of perspiration, whereby the human body keeps cool. Some air movement is always necessary for comfort, at rates of about 20-40 ft per min. The V. of a room is usually measured by the number of air changes per hr: thus a room 1000 cub. ft in volume needs 2000 cub. ft of air to enter to give 2 air changes. Domestic bathrooms and W.C.s require 3 air changes per hr, larders 2, living-rooms rather less. Higher rates are generally required for public buildings (e.g. 1000 cub. ft per hr per person), offices, etc. In factories and mines (*see* COAL-MINING) V. demands special attention, and standards are laid down by the Factories Act, 1937 (Section 4), for the former, and the Mines and Quarries Act, 1954, for the latter.

Natural Ventilation. In houses and other small buildings natural V. is usually quite adequate. Even with all doors and windows closed, plenty of air can pass through the gaps around them; indeed, it is often desirable to fit draught-excluding strips to conserve warmth in the winter. On no account, however, should the V. below timber floors be interfered with, or decay may result (*see* DRY ROT); care should also be taken not to reduce V. below what is necessary for coal or gas fires to draw properly. With large buildings it is necessary to consider the effects of wind and of convection currents due to temp. differences, before deciding whether natural V. will be adequate.

Forced Ventilation. In its simplest form a forced-V. system may be simply an extractor fan mounted in a wall or window. A system for a complete building uses ducts to distribute air from a central fan installation; if this air is also heated or cooled and recirculated after filtering and washing the system is more properly termed air conditioning (q.v.).

See A. A. Jones, *Modern Heating and Ventilation*, 1935; O. Faber and J. H. Kell, *Heating and Air Conditioning of Buildings*, 1937; J. Porzee, *Handbook of Heating, Ventilating and Air Conditioning*,

1942; *British Standard Code of Functional Requirements for Buildings*, Chapter 1(C), *Ventilation*.

Ventimiglia, It. seaside resort, in Liguria (q.v.), on the Roja. It is on the Riviera (q.v.), 3 m. from the Fr. frontier, and has a 12th-cent. Gothic cathedral and a notable 11th-cent. church. The Balzi Rossi grottoes contain palaeolithic remains, and E. of the tn are the remains of the Rom. settlement, *Albintimilium*. There is a trade in flowers. Pop. 15,000.

Ventnor, tn in the Is. of Wight. The climate is mild and suitable for invalids. In the summer V. is a pleasure resort. St Boniface Down, a hill rising to 764 ft behind the tn, is a property of the National Trust. The Royal National Hospital for diseases of the chest is outside the tn. Pop. 6900.

Ventôse (windy month), sixth month of the year in Fr. revolutionary calendar. *See* CALENDAR.

Ventriloquism, art of speaking in such a manner that the sound appears to be produced at a distance from the speaker. The origin of the word, from *venter*, belly, suggests that the voice was supposed to proceed from the speaker's stomach. The words are, however, produced in the usual manner, though some consonants may be masked by the immobility of the lips and teeth and the restricted use of the tongue. The art was practised by the ancient Greeks and Egyptians. *See* A. Prince, *Whole Art of Ventriloquism*, 1920; S. Vereker, *Ventriloquism as a Hobby*, 1938; D. Craggs, *The A.B.C. of Ventriloquism*, 1946.

Ventura, cap. of Ventura co., California, U.S.A., 65 m. NW. of Los Angeles, between Santa Clara and Ventura rvs. It is an oil-shipping and refining point in an agric. area with oilfields. San Buenaventura Mission was estab. here in 1782 by Junipero Serra. Pop. 16,500.

Venturi Flowmeter, *see* WATER MEASUREMENT; HYDROKINETICS.

Venus. In an indictment the V. is the statement of the co. or other geographical div. in which the trial of a person accused of an indictable offence is to take place (*see* INDICTMENT, and JURY), and also, as a rule, the place where the crime was committed. As the V. should, by the common law, be the jurisdiction within which the crime was committed, the trial generally takes place there too. But to this general rule there are exceptions; e.g. offences committed on a Brit. ship (*see* MERCHANT SHIPPING ACTS) may be tried in any co. where the offender is in custody; offences against the Customs Acts are triable in any co. Again, the V. as to forgery, bigamy, larceny, or embezzlement by public servants may be laid either in the co. where the crime was committed or in the place of arrest; and there are special rules applying where the offence was committed partly in one and partly in another co.

Venus, *see* APHRODITE.

Venus, the most conspicuous and brightest planet. Phosphorus, the morning star, and Hesperus, the evening star

were its names among the Greeks. It is frequently visible in daylight. It moves at a mean distance from the sun of 67,200,000 m. in an orbit of less eccentricity, 0.007, than that of any other planet, at a velocity of 22 m. per sec.; the revolution is completed in 225 days (its sidereal period), its synodic period being 583.92 days. The inclination of its orbit to the plane of the ecliptic is under $3\frac{1}{2}^\circ$. The apparent diameter varies from $10''$ to $61''$, its distance from the earth varying from 26,000,000 to 160,000,000 m. The real diameter is 7600 m., the planet being practically the same size as the earth therefore, and its mass is 83 per cent, density 94 per cent, superficial gravity 90 per cent those of the earth. Owing to its position inside the earth's orbit V. exhibits phases; the discovery of the gibbous phase by Galileo in 1610 being one of the facts which disproves the Ptolemaic system, and supports that of Copernicus. The transit of V., its passage across the sun's disc at inferior conjunction, is a rare phenomenon, and occurs about 6 June or 7 Dec., but takes place outside these dates; actual past or future dates are 6 Dec. 1631; 4 Dec. 1639; 6 June 1761; 3 June 1769; 8 Dec. 1874; 6 Dec. 1882; 7 June 2004; 5 June 2012; 10 Dec. 2117; 8 Dec. 2125; 11 June 2247; 8 June 2255. Horrocks and Crabtree in England were the first (1639) to observe a transit, which Horrocks (q.v.) had predicted, since when they have been specially observed elaborately by scientific expedition to the best stations. The matter was one of great importance as a means of determining the parallax (q.v.) of the sun, but more accurate methods are now adopted.

Surface Markings. The best telescopes fail to show any well-defined markings on the disk of V., and even the red and infra-red photographs obtained in 1927 by Ross at Mt Wilson, using filters of different colours before the plates, revealed no markings. Some of the photographs taken with blue light showed very weak markings, and those taken with ultra-violet light showed a considerable amount of detail on the disk. These markings are located in the atmosphere of V., and so give no information about the surface features. The lack of permanence in details revealed by photography makes it impossible to be certain about the period of V.'s rotation. Ross suggested 30 days as a probable period, and it is believed that the actual figures are close to this, though probably some days less. What is certain, however, is that the atmosphere of V. contains a large amount of carbon dioxide, but all attempts to detect oxygen and water vapour have failed. The temp. of the sunlight side of the planet is about 50°C ., and that of the dark side is about -20°C . V. is a disappointing planet, when viewed through the telescope. About the time of inferior conjunction it displays a crescent disk-like new moon, which increases from night to night, passing through all the phases characteristic of the waxing moon, until it looks like the

full moon when it is in superior conjunction about $9\frac{1}{2}$ months later. After this it goes through the phases of the waning moon, attaining the crescent-like new moon $9\frac{1}{2}$ months later. While V. can be seen both as a morning and an evening star, it can never be seen all through the night, though periodically it sets some hrs after the sun, and at such times appears very brilliant in the heavens. The albedo of V.—the percentage reflected to the total light falling on the surface of a body—is 59, compared with moon's albedo of 7 per cent. A high albedo usually indicates the presence of a cloudy atmosphere—a condition prevailing on V.

Venusberg, see TANNHÄUSER.

Venusia, see VENOSA.

Venus's Fly-trap, see DIONAEA MUSCIPULA.

Venus's Looking-glass (*Specularia hybrida*), campanulate plant with purple flower, often grown in garden borders and beds.

Vera Cruz: 1. Gulf state of Mexico. The surface is broken up by large tidal lagoons and rivs., behind which is a gently rolling stretch of fertile lands which rise gradually to the base of the Sierras, whose valleys and precipitous wooded slopes form the S.E. flank of the great centre tableland. Cihatlápetl, the highest mt in Mexico (18,204 ft) is on its W. border. The products are cedar, fancy and hard woods, coffee, sugar, alcohol, vanilla, tobacco, bananas, and beans. There are textile mills and breweries in Orizaba, and soap factories and flour mills in the state. There are oilfields in the N. and S. parts of the state. Jalapa (q.v.) is the cap. Area 27,736 sq. m.; pop. 2,040,231.

2. Seaport lying on the S.W. coast of the Gulf of Mexico, in the state of the same name, and 264 m. E. of Mexico City by rail. It is built on low-lying sand-banks and has a harbour protected by sea-walls. Cortés (q.v.) landed on the gulf coast near the site in 1519, founding the city of the True Cross or V. C. the next year; and from here launched the campaign which was to result in Iberian colonisation of the Americas. From the docks of V. C. may be seen the grim fortress of San Juan built by Cortés. There are extensive, sloping beaches of fine sand. The old port of V. C. was abandoned in 1609, and the new city was estab. a little farther to the S. From V. C. a colonial road was built into the highlands by way of Jalapa, a route paralleled by the modern railway. V. C. remains the chief Mexican port. There are manufs. of furniture and tobacco: the prin. exports are metal ores, coffee, bananas, tobacco, hides, sugar, and rubber. Pop. 101,515.

Veraguas, prov. of Panama, extending across the isthmus. Its mts reach 6000 ft. There are the usual tropical products and various minerals, but only a little gold is mined. The cap. is Santiago. Area 4600 sq. m.; pop. 107,000.

Veratrine, poisonous crystalline powder derived from sabadilla seeds by bruising, boiling in alcohol, and precipitation with

an alkali. It is sometimes applied externally as a local analgesic, if the skin is unbroken, and in the form of an ointment as a parasiticide, especially in cases of pediculosis capitis (see Lice).

Veratrum, or **False Hellebore**, genus of perennial plants (family Liliaceae) with decorative leaves and panicles of white, green, or purple flowers. *V. album* yields the poisonous powder known as Hellebore powder, which is mixed with water and used as an insecticide.

Verbanus Lacus, see MAGGIORE, LAKE.

Verbena, or **Vervain**, genus of herbaceous plants and shrubs. *V. officinalis* is the common Brit. wayside plant, with slender spikes of small lilac flowers. There are about 200 species, mainly indigenous to America. The Garden *V. (V. × hybrida)* is grown as an ann. varieties Firefly and Lawrence Johnston being very fine.

Verbenaceae, family of herbs, shrubs, trees, and climbers, about 3000 species, chiefly tropical and sub-tropical. Teak (q.v.) is the most important. Genera include *Callicarpa*, *Caryopteris*, *Clerodendron*, *Gmelina*, *Lantana*, *Lippia*, *Petrea*, *Tectona*, *Verbena*, and *Vitex*.

Vercellae, see VERCELLI.

Vercelli: 1. Prov. of Italy, in NE. Piedmont (q.v.). The N. half of the prov. is in the Alps (q.v.); the S. is part of the great N. plain of Italy, and is watered by the Sesia, a trib. of the Po (q.v.). The prin. tns include V. and Biella (qq.v.). Area 1182 sq. m.; pop. 389,000.

2. (Anc. Vercellae), It. tn, cap. of the prov. of V., 38 m. NE. of Turin (q.v.). It is near the R. Sesia, at the junction of the Milan-Turin rd. with the road from Genoa. Here, in 101 BC, Marius (q.v.) vanquished the Cimbri (q.v.). There is a baroque archiepiscopal cathedral, and a 13th-cent. basilica. The tn is the centre of a great rice-producing area, and has sugar, engineering, and textile manufs. Pop. (tn) 36,100; (com.) 41,100. See VERCELLI BOOK.

Vercelli Book, or **Codex Vercellensis**. Early Eng. MS., discovered in 1822 by Dr Friedrich Blume, a Ger. jurist, in the cathedral library at Vercelli (see above). Besides 6 homilies and a prose 'Life of Guthlac,' it contains 6 poems, including 'Andreas,' Gynewulf's 'Elene,' the 'Dream of the Rood,' and an 'Address of the Soul to the Body.' A facsimile ed. was pub. in 1894.

Vercingetorix (d. 46 BC), chieftain of the Arverni, a Gallic tribe. He led a revolt against the Romans with great ability, but was delivered to Caesar on the surrender of Alesia (52 BC). After adorning Caesar's triumph in 46 BC he was put to death. See life by M. A. Leblond, 1937-8.

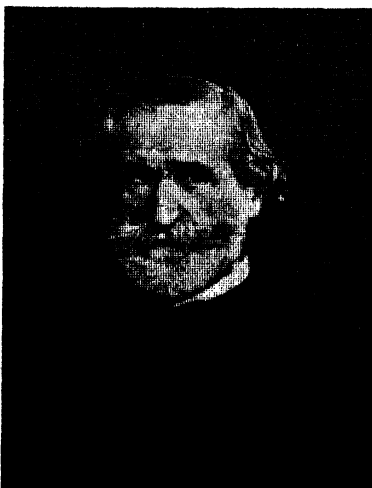
Verd-Antique, old Fr. name for what the Romans called *lapis atractus*, from Atrax in Thessaly, its place of origin. It is a fine green serpentine mixed with limestone, variegated often with brown or white patches. The columns of the Lateran basilica are composed of this stone.

Verde, Cape, see CAPE VERDE ISLANDS.

Verdelho Wine, see MADEIRA WINE.

Verden, Ger. tn in the Land of Lower Saxony (q.v.), on the Aller, 43 m. NNW. of Hanover (q.v.). In 782 Charlemagne (q.v.) decisively defeated the Saxons here. From 1405 to the mid-16th cent. V. was a free imperial tn; it passed to Sweden in 1648, to Denmark in 1712, and to Hanover in 1715. It has beer and tobacco industries. Pop. 11,000.

Verdi, **Giuseppe** (1813-1901), It. composer, b. Le Roncole, near Busseto, Parma, son of a poor innkeeper and grocer. He became a choir-boy in the local church at the age of 7, and was taught by the organist, in whose place he was appointed in 1823. At 11 he went to school at Busseto. Barezzi, a friend of V.'s father,



VERDI: PORTRAIT BY BOLDINI

took him into his house in 1826, and he learnt much from the cathedral organist, Provesi. He had an overture performed and had composed for a military band in 1828, and the next year he wrote a symphony and deputised for Provesi. In 1831 V. was sent to Milan with a scholarship and some financial help from Barezzi, but was rejected by the Conservatory as over entrance age. He studied, however, with Lavigna at the Scala Theatre. In 1836 he married Barezzi's daughter, Margherita, by whom he had 2 children; but the whole family died between 1838 and 1840.

Meanwhile V. had composed his first opera, *Oberto*, which was produced at La Scala in 1839. A second, *Un giorno di regno*, was a failure, having been composed at the time of his bereavements; but *Nabucco*, produced there in 1842, had a great success. In the cast was Giusep-

pina Strepponi, who became a great and loyal friend and later V.'s second wife. *Ernani* was produced in 1844. *Rigoletto* in 1851, *Il Trovatore* and *La Traviata* in 1853. In 1871 V. excelled his previous efforts with *Aida*; then, in his old age, after a long interval, he produced his 2 great Shakespearean masterpieces: *Otello*, 1887, and *Falstaff*, 1893. Among the operas not yet named the most important are *Macbeth*, 1847, rev. 1865, *Luisa Miller*, 1849, *Simon Boccanegra*, 1857, rev. 1881, *Un ballo in maschera*, 1859, *La forza del destino*, 1862, and *Don Carlo*, 1867, rev. 1884. A great non-operatic work deserves notice: the *Requiem*, 1873, in memory of Alessandro Manzoni. Choral works include *Pater Noster*, *Ave Maria*, and *Stabat Mater*.

V. is the artistic successor of Donizetti and Bellini, but shows a far greater wealth of passionate feeling, musicianly craftsmanship, and power of enlightening pathos or tragedy by a simple and suggestive spirituality. His music was essentially it, in character, and owed nothing to Wagnerian influences. His musical development was as varied as that of Beethoven: his lyricism was always constant, but his last works show also a rare spirituality, a refinement, and religious consciousness which place him among the foremost composers in the field of sacred, as well as of operatic, music. See lives and studies by C. Bellaguer, 1911; A. Weissmann, 1922; M. Bonaventura, 1923; E. Checci, 1926; F. Werfel, 1924, 1944; F. Bonavia, 1930, 1947; A. Alberti, 1931; C. Gatti, 1931, 1951; F. Toye, 1931; M. Chop, 1938; D. Hussey, 1940, 1948; G. Monaldi, 1951.

Verdict. In civil trials the jury, after the judge has summed up the evidence, determine by their V. all issues of fact, and if they find for the plaintiff assess the damages. Damages are said to be 'liquidated' when the jury can arrive at the amount by mere arithmetic or calculate them according to a scale of charges or some other accepted rate of percentage (see *Odger's Principle of Pleading*). But when the amount is arrived at after consideration of all the circumstances, including the conduct of the parties, the damages are 'unliquidated.' In this latter case they may be *contemptuous*, when the jury think the plaintiff ought never to have brought his action; *nominal*, when, though the plaintiff was justified in suing, he has suffered no special damage, and has sued rather to clear his character or establish a right; *substantial*, when the plaintiff is entitled to fair compensation; and *vindictive*, when the jury desire to punish the defendant by making an example of him (this is permissible only in actions of breach of promise, libel, seduction, assault, malicious prosecution, false imprisonment, trespass, and slander). In criminal law V.s are said to be either: (1) *general*, i.e. guilty or not guilty; or (2) *partial*, i.e. guilty on one count (see *INDICTMENT*) and not guilty on the rest; or (3) *special*, i.e. where the jury find a certain state of facts and leave it to the judge to decide upon those facts whether

the offence charged has been committed. In Scots law there is a middle V. of *non-proven*, but Eng. jurisprudence has never favoured any rule that militates against finality one way or the other in criminal trials. Where the jury cannot agree they must be discharged, and the accused is then tried before a new jury. If a juror dies or is taken ill a similar result follows. Before a jury arrive at a V. they ought to satisfy themselves: (a) that the facts are satisfactorily proved; and (b) that the circumstantial evidence (see *EVIDENCE*) is not only consistent with guilt, but is inconsistent with any other reasonable conclusion.

Verdigris, see **ACETIC ACID**.

Verditer, basic copper carbonate obtained when sodium carbonate is added to a solution of copper sulphate. It is greenish blue in colour, but is little used as a pigment, as it is very poisonous.

Verdun, Fr. tn in the dept of Meuse, on the Meuse. It has long been a fortress, commanding an approach to the Paris basin. There was a Gallic settlement here, and, later, the Rom. fortress Verodunum. Here, in 843, the threefold div. of the Frankish empire among the sons of Louis the Debonnaire was decided upon (see **CARLOVINGIANS**). The bishopric dates back to the 3rd cent. There are brewing, and textile and metallurgical manufs. Pop. 14,600. See also **WESTPHALIA**, **TREATY OF**.

2. City of Quebec, Canada, on the St Lawrence R., and on the Canadian National Railway, a W. residential suburb of Montreal (q.v.). It is named after Saverdun, bp. of Dupuis, who in 1672 received a grant of land. In 1830 it was renamed Rivière-St Pierre, but an Act restoring the name V. was passed in 1876. It became a city in 1912. V. has very few large industries. The main public-utility services are owned by the municipality. There are a number of churches, a general hospital, and a hospital for mental patients. Pop. 77,500.

Verdun, Battle of (1916), began on 21 Feb. 1916 and continued, intermittently, until June 1916. (For the political considerations which decided the Ger. Gov. to endeavour, at all costs, to take Verdun, see **WORLD WAR, FIRST**.) The attack, in the first phase of this remarkable battle, or series of battles, was heralded by an artillery bombardment of quite exceptional intensity. A few days later the Ger. infantry, wave upon wave, advanced up the slopes of Douaumont Hill (see **DOUAUMONT**), suffering extraordinary casualties from the famous Fr. 75s and mitrailleuses. Gen. Pétain's arrival with timely reinforcements thwarted this plan, and, the following day, a Fr. counter-attack was ordered which, in the result, changed the whole aspect of the attack. For days a tremendous battle was waged around the ruins of Fort Douaumont and by the first day of Mar. the Ger. attack slackened, a respite which enabled the French to bring up ever more reinforcements and supplies. In the first phase of the struggle for Verdun, the French had been called on to defend the heights of the

Meuse, but, in the next phase, the struggle was transferred to the W. bank of the Meuse, the Ger. object being to remove the Fr. threat across the riv., so as to turn Douaumont by taking Pepper Ridge, which, like Douaumont, lay in a commanding position to the N. of Verdun. The fiercest fighting raged round Mort Homme, the key of the position on the W. bank of the riv., but, though the fighting continued throughout Mar. and into April, the Ger. effort failed to gain the coveted city. Still undaunted, the Germans at the end of May launched the most desperate attacks on both sides of the riv. and, after a struggle of amazing intensity, during which Gen. Nivelle vainly counter-attacked to regain Douaumont, the Germans succeeded in capturing Fort Vaux, on 7 June, and thus, at all events, had won 2 important positions of the exterior ring of the permanent fortifications. This, however, marked the limit of Ger. success, for the next important fort, Souville, was never reached, and the French were never driven from the S. slopes of the Mort Homme hill, so that Verdun was saved, and all the Germans had gained in return for the vast sacrifices made were a piece of ter. NE. of Verdun and less than 12 sq. m., 2 shattered forts, and some ruined vils. It is computed that the Ger. casualties were about 300,000.

Vere, Sir Aubrey de, see DE VERE, SIR AUBREY.

Vere, Aubrey Thomas de, see DE VERE.

Vere, Sir Francis (1560-1609), soldier, brought up by Sir Wm Browne. His whole life from 1585 to 1604 was engrossed in active service, chiefly in the Lowlands. He played a gallant part in the defence of Sluys (1587), the relief of Rheinberg (1589), the fights at Breda (1589) and Groningen (1594), the victories at Turnhout (1598) and Nieupoort (1600), and the defence of Ostend (1601-2). He also shared in the success of the Cadiz expedition (1596). There is an ed. of his *Commentaries*, 1883. See Sir C. R. Markham, *The Fighting Veres*, 1888.

Vere, Horace, Baron Vere of Tilbury (1565-1635), soldier, was brother to Sir Francis V. (q.v.). As commander of the Eng. troops in Holland (1604) he recovered Sluys. In the Palatinate he was obliged to surrender to Tilly at Mannheim (1622). See Sir C. R. Markham, *The Fighting Veres*, 1888.

Vereeniging, manufacturing centre and pleasure resort in the Transvaal, S. Africa, on the R. Vaal, 36 m. from Johannesburg by road. It is the largest coal-mining area in the Union, ann. output 4,500,000 tons. The great Iscor Steel Works are on the S. side of V., also brick and tile works, and electric power stations. Here is one of the largest generating stations in the Commonwealth. The Anglo-Boer War (1899-1902) Peace Treaty was negotiated and signed at V. Pop. (whites) 17,322; (Bantu) 41,103; (Coloured) 707; (Asiatics) 694.

Vereschagin, Vassili (1842-1904), Russian painter, graduated from the naval school of St Petersburg, but subsequently

studied art in that city and in Paris. A restless spirit, he fought under Kauffmann during his Turkestan campaigns (1867), visited India, the Himalaya, and Tibet (1873), went through the Russo-Turkish war of 1877, travelled in Palestine and Syria (1884), was at the front during the Sino-Japanese war (1894), and finally perished with the flagship *Petropavlovsk* during the struggle between his country and Japan. His sensational pictures were designed to disgust people with warfare by confronting them with its horrors.

Verga, Giovanni (1840-1922), It. novelist, b. Catania. He was one of the leaders of the It. school of realism, believing in complete objectivity. He is at his best when he describes the life of Sicilian peasants and fisherfolk, as in *Vita dei Campi*, 1880, *I Malavoglia*, 1881, *Novelle Rusticane*, 1883, and *Mastro Don Gesualdo*, 1889. His short story *Cavalleria Rusticana*, rewritten as a play, was the source of the libretto for Mascagni's opera of the same name. See Verga, *Cavalleria Rusticana and Other Stories*, trans. by D. H. Lawrence, 1928; N. Cappellani, *Opere di Giovanni Verga*, 1941.

Vergara, or Bergara, Sp. tn in the prov. of Gulpúzcoa, on the Deva, the scene of the convention ending the first Carlist war in 1839 (see CARLISTS). Textiles are manufactured. Pop. 9000.

Vergil, see VIRGIL.

Vergil, Polydore, or 'De Castello' (c. 1470-c. 1555). It. historian who spent the first and last years of his life in Urbino, his bp., but lived in England 1502-50. He had studied at Padua and Bologna. He was appointed archdeacon of Wells in 1508 and prebend of St Paul's in 1513. V.'s *History of England*, in Latin (pub. 1534) is particularly valuable for its account of Henry VII's reign. It was pub. in Eng. for the Camden Soc., 1844-6. V. also ed. Gildas, 1525.

Vergniaud, Pierre Victorien (1753-93). Fr. orator and revolutionary, b. Limoges. He entered the National Assembly in 1791, where he became, with Brissot (q.v.), leader of the Girondists, and, in Dec. 1792, urged an appeal to the people to decide the king's fate. After the king's execution he attempted, without success, to restrain Robespierre (q.v.), and, with other prominent members of his party, fell a victim to the Reign of Terror in Oct. 1793.

Verhaeren, Émile (1855-1916), Belgian poet, b. Saint-Amand, near Antwerp, and educ. at the Jesuit College of St Barbe, Ghent, and Louvain Univ. He was greatly influenced by Zola, and pub. (1883), *Les Flamandes*, a vol. of high-spirited poetry that shocked the respectable. A period of travel (including visits to London) was marked by: *Les Moines*, 1886, *Les Soirs*, 1887, *Les Débâcles*, 1888, and *Les Flambeaux noirs*, 1890, the last 3 pathological. Recovering from a severe nervous breakdown, he began to work the vein for which he is famous, realistic studies of modern life and labour, e.g. *Les Campagnes hallucinées*, 1893, *Les Villages illusoirs*, 1895, *Les Villes tentaculaires*, 1895. In the same

vein were *Visages de la vie*, 1899, and *Les Forces tumultueuses*, 1902. A greater calm is reflected in *Les Heures Claires*, 1896, *Les Heures de l'Après-midi*, 1905, and *Les Heures du Soir*, 1911. *Love Poems* were trans. by F. S. Flint (1910). See lives and studies by P. Mansell-Jones, 1926; R. Estève, 1928; C. Brütsh, 1929; E. Kuchler, 1930; A. Mockel, 1932; R. T. Sussex, 1938.

Veria, or **Verria**, see **BEROEA**.

Verjuice, acid juice of unripe grapes or crab apples, used in cooking.

Verkhne-Ural'sk, tn in the Chelyabinsk Oblast of the Urals, 44 m. N. of Magnitogorsk. It has a food industry and is an isolator for important political prisoners. It was founded as a fortress in 1734. Pop. (1926) 10,000.

Verkhoyansk, tn in Yakutia (NE. Siberia), on R. Yana, 656 m. NE. of Yakutsk. It is the 'Cold pole' of the world (lowest reading -83.6° F.). V. is the centre of a cattle-breeding and fur-trapping area, and there is tin mining near by. Pop. (1951) 3000 (Russian, Yakuts). Founded 1638, place of banishment.

Verkneudinsk, see **ULAN-UDE**.

Verlaine, Paul (1844-96), Fr. poet, b. Metz. His lyrics are of the so-called impressionist type: half sensuous, half mystic, intensely beautiful in inspiration and subtle in rhythm, akin to the compositions of Debussy, who has set some of them, e.g. the *Fêtes galantes*, to music. His early paganism, responsible for such Baudelairean works as the *Fêtes galantes*, 1869, inspired by the paintings of Watteau, *Poèmes saturniens*, 1865, and *La Bonne Chanson*, 1876, was superseded (after 12 years of a life of dissipation broken by illness) by devout Catholicism, which he adopted during his imprisonment at Mons for shooting at the poet Rimbaud. *Supplée*, 1881, is on a level with the finest religious poems ever written. Other works: *Romances sans paroles*, 1874, *Jadis et naguère*, 1884, *Les poètes maudits*, 1884, *Amour*, 1885, *Parallèlement*, 1890, *Bonheur*, 1891, etc. V. gave to Fr. poetry an entirely new and original music and broke away from the stilted Alexandrine verse. The melody of his poetry, the harmony of mood and sound, has found no rivals: V. combined this power of sound with, very frequently, deep emotionalism, and the combination produced a sense of poetry that was sharply poignant and extremely beautiful, without descending to sentimentality of any sort. At his greatest he ranks with Heine as one of the lyric singers who defies translation and imitation. See L. Lepelletier, *P. Verlaine et son oeuvre*, 1907; H. Nicholson, *P. Verlaine*, 1921; F. Porché, *Verlaine tel qu'il fut*, 1933; U. P. Underwood, *Verlaine et Angleterre*, 1938; C. Morice, *Verlaine poète maudit*, 1947; A. Adam, *Verlaine, l'homme et l'oeuvre*, 1953.

Vermeer, or **Van der Meer**, Jan (1632-1675), Dutch painter, b. Delft. Little is known of his life. He married in 1652, and was admitted to the Guild of Painters of Delft. He probably studied under

Karel Fabritius, a pupil of Rembrandt. In 1662 he was master of the Guild, and again in 1670. After his death he was forgotten, his work being assigned to Peter de Hooch and others. He was 'discovered' in 1866 by the Fr. critic Théophile Thoré, who wrote under the name W. Bürger. V. is now recognised as the most perfect of the Dutch masters in point of technique. His greatest qualities are his capacity for balanced design and his feeling for the play of light on colour, shown to perfection in his interiors. Forty-one pictures have been assigned to him. Of these the 'View of Delft' and the 'Head of a Girl' are in the Mauritshuis, The Hague; 'Lady Standing at the Virginals' and 'Lady Seated at the Virginals' are in the National Gallery, the 'Little Street' in the Rijksmuseum, and the 'Painter in his Studio' at Vienna. A number of pictures are in the U.S.A. Sev. paintings attributed to V. and acquired by public collections, notably 'Christ at Emmaus', were proved to be forgeries in 1945. See lives and studies by G. Vanzype, 1921; E. V. Lucas, 1922 and 1929; H. G. Fell, 1933-34; A. B. de Vries, 1948; F. van Thienen, 1949.

Vermelo, see **BERMEJO**, RIO.

Vermeylen, August (1872-1945), Flem. writer, b. Brussels. He was one of the leaders in the revival of Flem. literature, and one of the co-founders of the journal *Van Nu en Straks*, advocating a more serious and intellectual literature. As a critic and prof. at Brussels and Ghent Univs. he greatly influenced his generation. His philosophical novel *De wandelende Jood*, 1906, has been trans. into sev. languages. He also wrote an important *History of Plastic Art and Painting in Europe*, 1921-5.

Vermicelli, popular food in Italy, and so-called because it consists of worm-like threads (from It. *vermicello*, a little worm), made from the granular meal of certain kinds of wheat.

Vermiculite was originally thought to be mica which had undergone metamorphosis and considered of no commercial importance until 1936. To-day the U.S.A. and the Transvaal are the largest producers of V. It is formed from a micaceous ore, by heating to about 2000° F., and consists of a porous, flaky medium of small particles, sterile and highly absorbent and retentive of air and water, and light in weight. Its colour varies from white to yellow, brown, and green, and it expands to about 20 times its original volume on heating. The heated product has a very low density, high refractoriness at low temps., low thermal conductivity, chemical inertness, and is a non-conductor of electricity. It is thus used extensively in the building trade, giving nearly 10 times as much thermal insulation as does the same quantity of sand gravel concrete. V. plasters have excellent acoustic properties, and are highly moisture-resistant and crack proof. Apart from these major uses, a specially prepared form, neutral in reaction, is used in horticulture as a medium for raising plants from seeds

and cuttings, for which it is admirably suited. It is also employed in oil refining, and is one of the few materials whose supply is almost unlimited.

Vermilion, red variety of mercuric sulphide, HgS . It may be obtained by subliming the black sulphide formed by triturating mercury and sulphur together in a mortar. It is also prepared by digesting the black amorphous sulphide for some hours in alkaline sulphides. **V.** is used as a pigment, but is commonly adulterated with ferric oxide and red lead. On heating it readily sublimates, and this constitutes a test of its purity. **V.** occurs naturally as the red mineral cinnabar.

Vermin, general term for noxious animals, or those destructive to crops and game. Rats, mice, moles, weasels, foxes, and polecats are **V.** In Great Britain, by an Act of 1919, persons who do not destroy rats and mice on their land, wherever it is reasonably possible to do so, may be fined. The word is also used of the insect parasites of man, lice, fleas, etc.

Vernland, län in the SW. of Sweden, lying to the N. of Lake Vener and adjoining Norway. Copper and iron are mined, and there is an important wood-pulp industry. Cap. Karlstad. Area 7427 sq. m.; pop. 286,786.

Vermont, known as the 'Green Mountain State,' a New England state of the U.S.A., remarkable in its group for having no seaboard. It is bounded on the N. by Canada, on the E. by New Hampshire, on the S. by Massachusetts, and on the W. by New York. Lake Champlain, about 107 m. long, forms part of the W. boundary. The name ('Verd Mont') has reference to the Green Mts (highest peak, Mt Mansfield, 4393 ft), which traverse it from N. to S. **V.** is primarily an agric. state, producing oats, maize, barley, hay, potatoes, maple sugar, and apples. Its output of dairy products is among the greatest in the U.S.A., and it leads in the production of maple syrup and maple sugar, the output being (1947), 777,000 galls. of syrup and 191,000 lb. of sugar. The quarrying of marble, granite, and slate is the most profitable industry, asbestos and talc are produced, and there is lumbering and timbering. State forests and state forest parks cover 78,600 ac. Metal founding, flour milling, and the manuf. of hosiery, other woollen goods, and paper are also important. It has probably the fewest people of colour of any state, its white pop. being 99.8 per cent.

V. was the first state to be admitted to the Union formed by the original states. The legislature has 30 senators and 246 representatives: 2 senators and 1 representative are sent to Congress. The cap., Montpelier, has a pop. of 8600. Other tns: Burlington, 33,155; Rutland, 17,659; Bennington, 12,410; Brattleboro, 11,520; Barre, 10,922. Area 9609 sq. m.; pop. (1950) 377,747. See W. H. Crockett, *Vermont: the Green Mountain State*, 1921; Federal Writer's Project, *Vermont: A Guide to the Green Mountain State*, 1937.

Vermouth (from Ger. *vermouth*, worm-wood—see **ABSINTHE**), an aperitif made

from white wine compounded with herbs and usually fortified. Noilly Prat is probably the best known of the Fr. **V.s**, which are mostly drier and stronger than the It. **V.**

Vermuyden, Sir Cornelius (1596–1683), Dutch engineer, b. in the Netherlands. He came to England, and began working on the drainage of the Fens (q.v.) in 1621. In 1628 he received an Eng. knighthood, and between 1629 and 1637, and 1649 and 1656, was responsible for the draining of the Bedford Level (q.v.) at the command of the 4th Earl of Bedford and an association of landowners. He re-visited the Netherlands on behalf of Cromwell, 1653.

Vernadskiy, Vladimir Ivanovich (1863–1945), Russian scientist and thinker, one of the founders of geochemistry and the founder of bio-geochemistry; also the founder of many academic bodies (Commission for the Study of Natural Productive Forces in Russia, 1915, Ukrainian Academy of Sciences, 1919, Institute of Radiology, 1922, etc.). As a public figure **V.** was active in the Zemstvo (q.v.) movement, the State Council (elected member for Moscow Univ.), and the Constitutional Democratic party (see **CONSTITUTIONAL DEMOCRATS**). He opposed the Bolsheviks and in 1917–21 was on the White side, living in Kiev and Simferopol'. **V.** consistently rejected Marxist philosophy, building his own natural philosophy largely on the ideas of Fëdorov (q.v.).

Vernadon, manner in which the rudimentary leaves of plants are arranged in the bud.

Verne, Jules (1828–1905), Fr. novelist, b. Nantes. He first popularised that species of romance in which all kinds of more or less plausible scientific discoveries are made the basis of the most extravagant and thrilling adventures. His best stories are *Vingt mille lieues sous les mers*, *Le tour du monde en 80 jours*, *Cinq semaines en ballon*, 1862, his first success, and *Michael Strogoff*, 1880. See A. de la Fuye, *Jules Verne, sa vie et son oeuvre*, 1928; K. Allott, *Jules Verne*, 1940.

Verner, Frederic Arthur (1836–1928), Canadian painter, b. Sheridan, Ontario. He studied art in England, where he joined the Army, and served with Garibaldi in Italy, returning to Canada in 1862. Buffalo subjects and life in the W. were his favourite topics. He is represented in the National Gallery of Canada by 4 pictures.

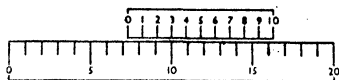
Verner's Law, phonetic law propounded in 1875 by the Dan. philologist Karl Adolf Verner (1846–96), b. Aarhus, Jutland; univ. prof. of Slavonic studies at Copenhagen. Its discovery was the result of investigations intended to solve certain difficulties and irregularities left unexplained by Grimm's Law (q.v.). In his outstanding article 'Eine Ausnahme der ersten Lautverschiebung', in *Zeitschrift für vergleichende Sprachforschung*, 23 (1872), pp. 97–130, Verner tries to reconstruct the position of the accent in the hypothetical original Indo-European, and suggests that when the accent falls on the

syllable before the consonant, Grimm's Law holds good; but when it falls on the following syllable, *p*, *t*, and *k*, become continuant *β*(bh), *ð*(dh), and *γ*(gh), later becoming stop *b*, *d*, and *g*, in most positions: e.g. Indo-European *bhrātēr*, cf. auct. Indian *bhrāda* (Gk *phrātēr*) gives Gothic *broþar*, Eng. *brother*, but Indo-European *pāter*, cf. auct. Indian *pitā* (Gk *pāter*), gives Gothic *ƿadar*, Old High Ger. *ƿatar*, Old Eng. *ƿader*.

Vernet, Antoine Charles Horace (1758–1838), Fr. painter, b. Paris, and commonly called **Carle Vernet**. He was the son of Claude Joseph V (1714–1789), a marine painter noted for his views of the seaports of France. C. V.'s 'Triumph of Paulus Aemilius' shows how much he had profited by his study of horses at riding schools and races. The 'Morning of Austerlitz' and the 'Battle of Marengo' are two of his finest works. C. V.'s son was Emile Jean Horace Vernet (1789–1863), a dashing military painter. For accounts of this dynasty of artists, see C. Blanc, *Les Vernet*, 1845; A. Dayot, *Les Vernet*, 1898.

Verney, Sir Edmund (1590–1642), knight-marshal and standard-bearer, member of an old Buckinghamshire family, educ. at Oxford. In 1623 he accompanied Prince Charles and Buckingham to Madrid. From 1624 he was a member of Parliament, and when King Charles appointed him knight-marshal in 1626, the Marshalsea prison became his charge. He was killed at the battle of Edgehill, fighting loyally for the king, though his personal sympathies lay with the Puritans. An excellent picture of 17th-cent. life in the circles of the landed gentry is given in the papers of the V. family. These comprise *Letters and Papers of the Verney Family down to 1640* (ed. J. Bruce), 1853, and *Memoirs of the Verney Family* (ed. Lady F. P. and Lady M. M. Verney), 1892–9, 1904.

Vernier, device invented by Pierre Vernier (c. 1580–1637) for reading the fractions of the smaller parts of a measuring scale. It is a scale which slides along the prin. scale, and is divided so that *n* of its divisions corresponds to *n* – 1 or *n* + 1 divisions on the prin. scale. It is used on all instruments which make linear or angular measurements, e.g. barometers, cathetometers, theodolites, sextants, telescopes, etc. To read the V., note the position of its zero and take the value of the nearest division, then look for the lines coinciding in V. and scale, and this gives the fraction of the division beyond the



scale mark nearest 0. Thus in the figure the V. 3 coincides with the scale 10 and the nearest division to the zero is 7, and since the scale is graduated in tenths the length from 0 on the scale to 0 on the V. is 0.73 in.

Vernis, Martin, Fr. name for a type of lacquer, especially popular in the 18th cent. The Martin brothers were famous for their lacquer work, in Louis XV's reign, hence its name. It was developed from oriental types.

Vernon, Edward (1684–1757), admiral, educ. at Westminster School. He served at the siege of Gibraltar under Sir George Rooke (1704) and in the W. Indies and the Baltic, and in 1739 captured Porto Bello with only 6 ships, an achievement celebrated in London with public fires.

Vernon: 1. Fr. tn in the dept of Eure, on the Seine. The Bizy forest is near by. V. is a quaint old tn, built in 1123 by Henry I of England. It manufs. chemicals and has stone quarries, mineral springs, and artillery engineering estabs. Pop. 11,200.

2. Tn of Brit. Columbia, Canada, 50 m. S. of Sicamous on the E. bank of Okanagan Lake, served by the Canadian National and Canadian Pacific Railways. Fruit-farming is widely carried on in the dist. Pop. 8874.

Verocchio, see VERROCCHIO.

Verolanium, see VERULAMIUM.

Verona: 1. Prov. of Italy, in W. Veneto (q.v.). The N. part of the prov. is in the Alps (q.v.), but the S. belongs to the great N. plain of Italy. In the NW. is the E. shore of Lake Garda (q.v.). The R. Adige flows NW.–SE. across the prov. The prin. tns include V., Legnago, and Villafranca (q.v.v.). Area 1220 sq. m.; pop. 652,000.

2. It. city, cap. of the prov. of V., on the Adige, 63 m. W. of Venice (q.v.). It is situated at the point where the road from the Brenner Pass (q.v.) joins the Venice–Milan road. The tn is of Rom. origin, and was later the seat of Theodoric the Great (q.v.), and an important tn of the Longobards (q.v.). In the 13th cent. it came into the possession of the della Scala (q.v.) family, with one of whom, Can Grande I, Dante (q.v.) found refuge. In 1405 it became part of the Venetian Rep., in 1796 it was taken by the French, and in 1797 it was ceded to Austria, under whose domination it formed part of the 'Quadrilateral' (q.v.). In 1866 it became part of united Italy. V. has many Rom. remains, including a magnificent amphitheatre, arches, and a theatre. There is a Romanesque–Gothic cathedral, and among the numerous other beautiful old churches are those of San Zeno (12th–13th cents.), one of the finest Romanesque churches in Italy, and the splendid Gothic church of Santa Anastasia (13th–15th cents.). The 14th-cent. Scaligeri Palace, and the exquisitely sculptured family tombs, recall the della Scalas. The battlemented Scaligero bridge, destroyed in 1945, has been rebuilt. P. is an agric. centre, has a trade in wine and marble, and has paper, plastics, and printing industries. Pop. 187,000. See F. S. Maffei, *Verona Illustrata*, 1731; A. Wiel, *Verona*, 1902 (Medieval Towns); A. M. Allen, *A History of Verona*, 1925.

Veronal, see BARBITONE.

Veronese, Paul, whose real name was Paolo Caliari or Cagliari (1528–88). It. painter, b. Verona. He studied under

Antonio Badile, and from 1555 lived in Venice. His gigantic paintings, including his religious works, exhibit rich colouring, broad composition, and that love of pomp and worldly splendour which led to charges of irreligion against him. The huge 'Marriage at Cana,' now in the Louvre, with its 130 figures (many portraits of famous people of the time), is typical of the exuberance of his art. Apart from the fine 'Vision of St. Helena' and the 'Family of Darius' (National Gallery, London), his best paintings and frescoes are in Venice, the Doge's Palace, the church of San Sebastiano, the Accademia, and the Villa Masiera. See F. P. Stearns, *Four Great Venetians*, 1901; P. H. Osmond, *Paolo Veronese: his Career and Work*, 1927.

Veronica, St. name given to the woman of whom tradition speaks as having wiped our Lord's face with a kerchief on the road to Calvary. A picture of Christ's face remained imprinted on the cloth. Her feast is on 12 July.

Veronica, or **Speedwell**, family Scrophulariaceae, genus of ann. or perennial herbs or shrubs, of about 200 species in temperate regions of the world. *V. officinalis*, Common S., *V. anagallis-aquatica*, Water S., *V. scutellata*, Marsh S., *V. montana*, Wood S., *V. chamaedrys*, Germander S., *V. spicata*, Spiked S., *V. fruticans*, Rock S., *V. alpina*, Alpine S., and *V. hederifolia*, Ivy S., and others are found in Britain. *V. beccabunga* is Brooklime. Many shrub species are grown in gardens.

Verrocchio, Andrea del (1435-88), real name Cione, It. artist, was 'goldsmith, master of perspective, sculptor, carver, painter, and musician' according to Vasari. He worked under Donatello, and Leonardo da Vinci was his pupil. The only authentic painting of his is the somewhat hard but forcible 'Baptism of Christ (Uffizi Gallery), though the 'Virgin and Child' in the National Gallery is ascribed to him. His renown has a sure foundation in the magnificent equestrian statue in bronze of Bartolommeo Colleoni, which adorns the piazza of SS. Giovanni e Paolo Venice. See M. Cruttwell, *Verrocchio*, 1904.

Versailles, Fr. tn. cap. of the dept of Seine-et-Oise, 11 m. SW. of Paris. It is a bishopric. From 1678 to 1769, V. was the prin. residence of the kings of France. On the site of a hunting lodge of Louis XIII, Louis XIV had built the magnificent palace of V., the work of Le Vau and J. H. Mansard (q.v.). The gardens were designed by Le Nôtre (q.v.), and much of the interior decorations are the work of Le Brun (q.v.). In addition to the great chateau, there are 2 smaller chateaux: the Grand Trianon, and the exquisite Petit Trianon, the favourite residence of Marie Antoinette. The famous halls and salons of V. have been the scene of many historic events: Britain's recognition of the independence of the Amer. colonies (1783); the tragedy of Louis XVI; the capitulation of Paris (1871) during the Franco-Prussian War (q.v.); the proclamation of William I of

Prussia (q.v.) as Emperor (1871); and the signing of the treaty of V. (see below) (1919). Pop. of V. tn 84,500. See P. de Nolhac, *Versailles et la cour de France* (10 vols.), 1925-30; G. Lenôtre, *Versailles au temps des rois*, 1934.



Ahnari

JESUS AND ST THOMAS

Sculpture by Verrocchio, set in a Tabernacle by Donatello in the Oratorio S. Michele, Florence.

Versailles, Treaty of (1919), signed on 28 June 1919 and ratified 10 Jan. 1920. (For the hist. of the conference which discussed the terms of peace following the termination of hostilities in the First World War see **PEACE CONFERENCE** (1919).) The plenipotentiaries of the Allied and Associated Powers met in Jan. 1919 at Versailles to draw up the conditions of peace for the defeated Central Empires. These Powers were the U.K. (represented by D. Lloyd George, A. Bonar Law, Viscount Milner, A. J. Balfour, and G. N. Barnes); U.S.A. (Woodrow Wilson and Robert Lansing); France (Georges Clemenceau); Italy (V. E. Orlando); and Japan (Marquis Saionji). The Brit. Overseas Dominions were also represented by: Canada (Sir G. Foster and C. J. Doherty); Australia (W. M. Hughes and Sir J. Cook); S. Africa (Gen. Botha and Gen. Smuts); and New Zealand (W. F. Massey). The minor Allied states represented were Belgium, Brazil, China, Greece, Poland, Portugal, Rumania, Yugoslavia (then known as Serbo-Croatia), and Czechoslovakia, besides various Central and S. Amer. states and others; and of these China alone refused to sign the treaty. The draft

was presented to the Ger. delegates on 7 May; on 22 June the Ger. National Assembly at Weimar by a majority of 99 (237 against 138) voted in favour of acceptance, and on 28 June the Ger. plenipotentiaries signed the treaty at Versailles. The original copy is deposited in the archives of the Fr. Rep.

ARTICLES OF THE TREATY. *The League of Nations.* In the forefront of the treaty were the clauses to establish the League of Nations and to provide for international action to preserve peace in the future by means of the Covenant of the League (see COVENANT OF THE LEAGUE OF NATIONS; LEAGUE OF NATIONS; see also under INTERNATIONAL COURT OF JUSTICE). The Monroe Doctrine (q.v.) is expressly excluded from the decisions of the League members. Provision is also made in these earlier articles for the administration of the ceded Ger. colonies and ter. by mandates of the League (see MANDATE SYSTEM).

Surrendered Territories. (i) Alsace-Lorraine to France; (ii) the greater part of the provs. of W. Prussia and Posen to Poland; (iii) the greater part of E. Silesia and of E. Prussia to Poland; (iv) a portion of Upper Silesia to Czechoslovakia; (v) Memel to Lithuania; (vi) Danzig, to be a Free State under the protection of the League of Nations; (vii) part of Schleswig to Denmark (see also SELF-DETERMINATION).

Military and Naval Clauses. These were designed for the dual purpose of compelling compliance with the terms of the treaty and of securing Ger. disarmament.

War-guilt. Under the treaty, the Allies 'publicly arraigned the ex-Emperor William II (who had fled to Holland) for a supreme offence against international morality and the sanctity of peace' and made provision for a special tribunal to try him. But in fact the Dutch Gov. could not and were not even expected to surrender their refugee.

Reparations. Germany accepted, under the treaty, responsibility for the loss and damage caused to the Allies by the War, and provision was made for assessing the amount of compensation to be paid by Germany in kind or money. Under the Financial Clauses the first charge upon the assets and revenues of the Ger. Empire was to be reparations, and up to 1 May 1921 Germany was forbidden to dispose of gold without the approval of the Reparation Commission (see DAWES PLAN; REPARATIONS; YOUNG PLAN).

Miscellaneous. There were also provisions relating to labour organisation, trade, and economic conditions; aerial navigation; ports and waterways; Ger. property in Allied countries was to be applied to meeting the claims of Allied citizens for debts or losses due to Ger. agency, war graves, etc. The whole treaty contains some 440 Articles, and the authentic text was presented to Parliament as Treaty Series No. 4 (1919), Cmd. 153. Alterations of the treaty in respect of the occupation of the Rhineland and reparations were effected by negotiation; the rest of the treaty was abrogated by

Hitler by unilateral action. See also under EUROPE. See Index to the Treaty of Peace between Allied and Associated Powers and Germany; E. J. Dillon, *The Peace Conference, 1919*; H. Nicolson, *Peacemaking, 1919, 1933*; H. W. V. Temperley, *History of the Peace Conference, 1920-4*; G. P. Gooch, *Studies in Diplomacy and Statecraft*, vol. 6, 1942; R. McCallum, *Public Opinion and the Last Peace, 1944*; D. P. Myers, *The Treaty of Versailles and After, 1947*.

Verse (Lat. *vertere*, to turn), a word used in 3 distinct senses in English. It can mean: (1) poetical writing in general as opposed to prose; (2) a single line of poetry; (3) a set of lines, or stanza. For V. structure and types of V., see METRE.

Versecz, see VRŠAC.

Verst, Russian linear measure equivalent to 3500 Eng. ft. See METROLOGY.

Vertebrates, or **Baekboned Animals**, form a div. of the animal kingdom which includes not only man and animals of similar structure (mammals), but also fishes, amphibians, reptiles, and birds. V. are characterised by the possession of a well-developed internal skeleton including a skull surrounding the brain, which is connected with the organs of sight, smell, hearing, touch, and taste.

Vertex, in geometry, the point of a triangle opposite the base; the point of intersection of lines bounding an angle; the intersection of a curve with its axis. See PARABOLA.

Vertical Take-off Aircraft. Any rotating wing aircraft derives its normal lift from horizontally turning rotors. The true helicopter is one which can rise direct from the ground and move in any direction. There have been various machines which employed the rotor principle, from those where lift alone was obtained by the rotors (the autogiro), which turned freely with the motion of the propeller-driven aircraft, to the modern orthodox helicopter which both rises and propels itself by means of its rotors. Helicopter toys were known to the anc. Chinese, and about 1500 Leonardo da Vinci designed a helicopter based on the Archimedean screw; but this design, of which a model was apparently made, was not known until late in the 19th cent. The first successful model helicopter in Europe was made in France in 1784 by Launoy and Bienvenu. During the 19th cent. many helicopter models were constructed, some of them making successful flights. The first helicopters to lift a man were made in 1907, one by Cornu and the other by the Breguet brothers. The first successful and practical helicopter was the Focke-Achgelis of 1937, but Sikorsky in the U.S.A. made (in 1939) the really practical vehicle from which most modern helicopters derive. The development of the helicopter was undoubtedly helped by the 'autogiro,' first flown in 1923 and considerably developed thereafter. Helicopters are both raised and propelled by one or more rotors, and the multi-rotor type can be either coaxial or in tandem, etc. A single rotor helicopter must normally have a small anti-torque propeller

at the tail, whereas twin coaxial or tandem rotor helicopters can dispense with this. Lift is obtained by controlling the collective pitch of the rotors, and forward thrust in any direction by the cyclic pitch. Thus a helicopter can fly up and down, forwards, backwards, or sideways. There are now many types flying, some in combination with ordinary propellers for forward thrust; and recently a number of one-man types have been built in which the pilot stands on a platform with contra-rotating coaxial rotors revolving below him. The helicopter is becoming growingly important for work in the fields of rescue, reconnaissance, agric. spraying, transport in otherwise inaccessible locations, and inter-urban passenger service.

The latest development, seen in the Fairey 'Rotodyne', is a machine with propellers, wings, engines, and a rotor. The rotor (jet propelled at tips) takes the aircraft up vertically; then forward thrust is taken over by the two propeller engines and lift shared by the small wings and the now freely rotating rotor.

Various other aircraft now under development have been designed to achieve vertical take-off (V.T.O.) and landing without the use of rotating wings, which limit forward speed to approximately 200 m.p.h. One promising type is the tilt-wing aeroplane which resembles an orthodox fixed-wing aircraft in forward flight, but has mechanism to pivot its entire wing through 90° during take-off and landing, so that the wing-mounted propellers then operate horizontally as rotors. Special air-jet or tail-rotor controls reduce stability and control problems during transition.

Another important V.T.O. technique makes use of direct jet lift, as pioneered by the Rolls-Royce 'Flying-Bedstead.' In this form of design, one or more jet-engines are mounted vertically in the aircraft's fuselage, their total thrust exceeding the all-up weight of the aircraft and so raising it vertically off the ground. At a safe height, normal forward-facing engines thrust the aircraft forward until its fixed wings are able to provide sufficient lift to keep it airborne, and the downward-exhausting jets are then switched off. In a variation of this technique, the downward-exhausting jets are made to swivel gradually through 90° after take-off to function as normal propelling engines during cruising flight.

Vertigo, or Giddiness, a sense of lack of equilibrium. It may be *aural*, connected with ear disturbances; *ocular*, connected with eye disturbances; *cerebral*, caused by disease or injury in the brain; *gastric*, caused by digestive disturbances; or may be due to the introduction of toxic substances, such as alcohol, tobacco, etc., into the blood. See EAR.

Verulam, Lord, see BACON, FRANCIS.

Verulamium, native Belgic settlement of importance, immediately W. of St Albans, Herts, England, founded at the end of the 1st cent. BC. It was sufficiently well developed shortly after AD 43 to be awarded the high status of *municipium*, an honour unique in the prov. of Britain.

The tn was sacked by the Iceni under Boadicea (Boudicca), in AD 61, but after the turn of the middle of the cent., a new tn of some 150 ac. was laid out. There was a further development in the 2nd quarter of the 2nd cent. It decayed much in the 3rd cent., but towards its end suffered a temporary reinstatement, only to waste again in the Dark Ages. The excavations in 1930 and the years following threw much light on the Rom. occupation of the SE. of Britain. There was a series of fine mosaics, a temple of unusual triangular plan which had votive deposits within the fabric, 2 triumphal arches, and an open-air theatre, the only one of its kind in Britain. Much of the tn plan was recovered, and the sites of temples, houses, shops, and streets were excavated. Part of the tn wall, the theatre, and a mosaic still remain in position, but most of the discoveries of note are represented in the well-arranged Museum. Especially important is the extensive series of pottery types, both Rom. and Belgic, and 2 fine pavements which are re-erected on the Museum wall. The excavations are now filled in, apart from the hypocaust, the heating system of a Rom. villa. See *Society of Antiquaries Research Report*, No. XI, 1936; R. L. P. Jowitt, *A Guide to St Albans and Verulamium*, new ed., 1948.

Vorus, Lucius Aurelius, joint-emperor with Marcus Aurelius (q.v.), his brother by adoption, from AD 161 to 169.

Vervain, see VERBENA.

Verviers, tn in the prov. of Liège, Belgium, situated on the R. Vesdre, 13 m. E. of the city of Liège. With its suburb Ensisval, it is one of the chief centres of the woollen industry. The large quantities of water required are supplied by the Gileppe dam, 6 m. to the E. Other manufs. are soap, leather, footwear, chocolate, and chemicals. Pop. 37,800.

Verwey, Albert (1865-1937), Dutch poet and critic, b. Amsterdam. He was among the founders of the *Nieuwe Gids* in 1889, and his early poetry is impressionistic and intensely individual. His mature poetry, however, is more contemplative, and has been criticised as over-intellectual. He was co-founder of the *Tweemaandelijksche Tijdschrift*, 1894-1902, and the *De Twintigste Eeuw*, 1902-5, and editor of *De Beweging*, 1905-19. V. was a critic of rare integrity, and his influence as literary historian was profound. In 1925 he was appointed prof. of Dutch Literature at the Univ. of Leiden. See J. J. Gielen, *De Dichter Verwey*, 1946.

Vesalius, Andreas (1514-64), Flem. anatomist, b. Brussels. He studied medicine in Paris, spent a year dissecting at Louvain, and graduated M.D. Padua in 1537. He was at once made prof. of surgery and anatomy there. At his lectures he did away with the prosectors, carrying out the dissections himself. At first he followed the teaching of Galen (q.v.), but soon confined his lectures to what he himself had observed. In 1543 he pub. *De Humani Corporis Fabrica*, one of the greatest of all medical works. With this book and in his own teaching V. replaced tradition in anatomy

by observation and experiment and did away with the reverence for authority in science, paving the way for the experimental era in medicine instituted by W. Harvey (q.v.). The *Fabrica* contains some magnificent plates, particularly of the muscles, and excellent descriptions of the bones and nervous system. It had a hostile reception from the Galenists, and V. gave up his teaching to become physician to Charles V. He d. on the is. of Zante while returning from a pilgrimage to Jerusalem. See C. Singer, *A Prelude to Modern Science*, 1946; life by M. Roth, 1892.

Vesicant, an agent which causes blistering. It may be a substance applied to the skin, such as cantharides and mustard, or a physical agent in the form of heat or ultra-violet light rays. See BLISTER.

Vesicaria, family Cruciferae. *V. graeca*, yellow-flowering perennial of Greece, is chief species now grown in gardens.

Vesicle, small sac containing liquid. Medical term for a blister (q.v.) or elevation of the epidermis containing serous fluid. See SKIN.

Vespasian, or **Titus Flavius Sabinus Vespasianus** (AD 9-79), Rom. emperor, b. Reate in central Italy, son of a tax collector. He owed his rapid rise undoubtedly to his military genius; in 43, as *legatus legionis* in Britain, he reduced the is. of Wight. Nero disliked him, but could not dispense with his services, and thus V. was in Judaea, where he had been sent in 66 to conquer the Jews, when tidings reached him of his proclamation as emperor (69). Vitellius, his rival for imperial honours, was defeated by Antonius Primus, and, largely owing to the support of Mucianus, V. was soon firmly estab. on the throne. See also ROMAN HISTORY. See B. W. Henderson, *Five Roman Emperors*, 1927; C. Longford, *Vespasian and some of his Contemporaries*, 1928.

Vespers, see BREVIARY.

Vespers, the Sicilian, see SICILY.

Vespucci, Amerigo (1451-1512), It. navigator, b. Florence. He began his career at Seville as a merchant, but his interest in the exploits of Columbus induced him to abandon this profession, and he set sail for the New World in 1499.

The first discovery of the mainland of America, at Paria, was made by Columbus in the course of his third voyage in 1498. In 1499 Alonso de Ojeda, having on board V., reached a point farther S., somewhere, it is conjectured, on the coast of Surinam and thence went northwards to the Gulf of Paria; after that to Venezuela, which he so named. V.'s account of the natives of Venezuela is 'curious and interesting' and his narrative, spreading over Europe, was the cause of his name being given to the third part of the inhabitable globe. See *Letters of Vespucci*, trans. for the Hakluyt Soc. by C. R. Markham, 1894; *Vespucci Reprints*, 1916; F. J. Pohl, *Amerigo Vespucci: Pilot Major*, 1945.

Vest-Agder, co. of Norway on the N. Sea. It has forestry, farming, fishing, and some industry. The cap. is Kristiansand. Area 2793 sq. m.; pop. 96,900.

Vesta, Rom. goddess of the hearth, Gk 'Hestia' (q.v.). From Lavinium whither Aeneas had brought, from Troy, the sacred fire as well as the Penates, her worship was traditionally introduced to Rome by Numa, who was believed to have built her central shrine in the Forum between the Palatine and Capitoline hills. Here her fires were kept burning by the Vestal Virgins (see VESTALS). The 'Vestalia' were celebrated on 8 June.

Vesta, minor planet discovered in 1807 by Olbers of Bremen, was the fourth in order of discovery, and is the brightest, being the only one visible to the naked eye, and as bright as a 6th magnitude star. It has the greatest albedo of all minor planets, and a diameter of c. 250 m. (Bamond), 214 m. (Farley). Revolution is performed in 3.63 years at a mean distance of 219,000,000 m.

Vestals, The, 6 priestesses of Vesta (q.v.), in her temple at Rome. They were chosen by lot from 20 maidens of free and worthy parentage, selected by the pontifex. They officiated for at least 30 years; 10 years of learning and initiation, 10 of actual ministration, and 10 teaching the neophytes. The violation of the vow of chastity was punishable by death, and retribution followed if they allowed the sacred fires to go out.

Vesteras, see VÄSTERÅS.

Vestertoppen, see VÄSTERBOTTEN.

Vesternorrland, see VÄSTERNORRLAND.

Vestfold, smallest co. of Norway, on the W. side of Oslo fjord. It has forestry, farming, and considerable industry, also shipping and whaling. Area 903 sq. m.; pop. 154,500.

Vestmanland, see VÄSTMANLAND.

Vestmanneyjar, or **Westmen Isles**, some rocky is. on the S. coast of Iceland, surrounded by excellent fishing-grounds. Harbour facilities are good, but communication with Reykjavik is now principally by air, usually sev. flights a day when weather permits. Pop. 4070.

Vestments, **Oriental Ecclesiastical**. These differ widely now from those in the W. Church (see VESTMENTS, SACRED), though originally they were in most cases identical. For convenience the name of a W. equivalent is, where possible, given first in the following list, followed by the Gk name. The E. rite being vernacular, the vestments are also called by other names in different countries.

ALB, *Sticharion*, like the W. alb, but with a single line of embroidery around the bottom. A bishop's has 2 red-and-white stripes from top to bottom, called *potamoi* (rivers) from John vii. 38. The *Sticharion* is generally white.

STOLE: (1) that of a bishop or priest, *Epitrachelion*; (2) that of a deacon or sub-deacon, *Orarion*. (1) The *Epitrachelion* is the same as the Lat. stole, but wider, and hangs around the neck and down in front, where it is sewn together. In effect, it is now a long, broad piece of stiffened cloth, with a hole at one end for the head. It is of the same colour as the chasuble. (2) The *Orarion* is like the Lat. stole, but worn by the deacon with one end over the left shoulder, across the

breast, under the right arm and across the back to hang low over the left shoulder in front. This end is held up by him when intoning the Litanies. The *Orarion* is worn crossed upon the breast and the back by the deacon for Communion, and always so by the sub-deacon.

CUFFS, *Epimanikia*, are worn over the wrists of the *Sticharion*. Coloured like the stole, and embroidered with a cross, they are derived from the gloves worn by the Byzantine Emperors when receiving Holy Communion in the palms of their hands. They granted the use of them to dignitaries, from whom it passed later to all clerics. But as these had the privilege of receiving the Host in their bare hands, the gloves became cuffs (cf. the bishop's gloves in the W. rite).

GIRDLE, *Zone*, a band of material coloured to match the chasuble, fastened around the *Sticharion* and *Ephitachelion* with tapes at the back.

DAIMATIC: 1. The *Stichar*, worn by the deacon and sub-deacon, is a long, straight tunic with short, wide sleeves, like that of the W. rite. 2. The *Sakkos*, worn by the bishop, is the same but embroidered with a multitude of crosses (*polystaurion*). The bishop wears this in place of a chasuble. Its colour varies with the season.

CHASUBLE, *phelonion* (*paenula*), identical with that of the W. rite, but instead of being shortened at the sides, it has been shortened in front to leave the forearms free. It has a cross embroidered on the shoulders at the back. Its colour varies with the season (see *Liturgical colours*, below).

MANIPLE, *Epigonation*, worn only by dignitaries. There are 2 kinds, the oblong and the lozenge. They are made of stiffened brocade, to match the *Phelonion*, and hang at the hip by tapes from the *Zone*. They are thought to be derived from a handkerchief or purse, often carried in the hand by Rom. officials, and which they are seen waving in monumental reliefs to start public games. The Pope still wears such a vestment.

PALLIUM, *Omophorion*, like the Lat. Pallium (q.v.) but broader and made of coloured material to match the *Phelonion*. It is worn over the bishop's *Sakkos*, and consists of a long stiff scarf hanging around the shoulders to make a loop in front, and having its ends hanging down in front and at the back.

MANTLE, *Mandyas*, worn by all bishops when not wearing the *Omophorion*. It is of Persian origin, a military cloak adopted first by the Emperors.

BIRETTA: 1. *Kalymmaechion*, worn by monks under a long wide veil of light, black material called the *Epirhptarion* or *Epanokalymmaechton*. The *Kalymmaechion* is black, cylindrical and without a brim. 2. *Skouphia*, worn by the secular clergy, round, black, brimless, and in Russia pointed at the top, but worn without a veil.

CROZIER, *Poemantike Rhabdos* (pastoral staff), *Balderion*, or *Dikamikon*, carried by bishops and Archimandrites (Abbots)

with a sudarium, or holding cloth. It is the size of a large walking-stick, surmounted by a T cross, the arms of which are curved upward and in to form 2 serpents confronting each other. Armenian bishops carry a W. style crozier.

MITRE, *Mitra*, a diadem, shaped like the papal tiara, but swelling at the top, rich and sometimes jewelled. It is worn by bishops, but sometimes conferred also on Archimandrites (Abbots) and Archpriests. Armenian priests all wear it, their bishops wearing a W. style mitre.

PECTORAL CROSS, *Stauros*, worn by Gk bishops, and Russian bishops and priests generally.

Enkolpion, or *Panagion*, a medallion of the Blessed Virgin, is worn by bishops only, on the breast, and is characteristic of them.

Dikerrion and *Trikerion*, are a pair of candelabra holding 2 and 3 candles apiece to represent the 2 natures in Christ, and the Holy Trinity. The bishop blesses the people with them, especially after the Sanctus.

LITURGICAL COLOURS of the E. rite are these: black, for Masses of the Pre-sanctified; violet, dark green, or some such sub-fuso colour, for Lent; white for feasts, but red for Easter, and for martyrs. Multi-coloured V. and cloth-of-gold are frequently used.

Vestments, *Sacred*, have been worn by the priesthood from time immemorial. The O.T. regulations are extremely minute, but in spite of apparent resemblances, no connection can be traced between these and the Christian V. The earliest mention of special Christian V. is at Jerusalem in 330 (Theodoret, *Eccles. Hist.* ii, 27). In the first cents. ordinary dress (though no doubt the best available) was used in sacerdotal functions, and this remained the Rom. usage to the 6th and 7th cents., when barbarian fashions coming in conflicted with religious conservatism concerning dress, and turned the old everyday garments into ceremonial V. The V. for a priest in the W. Church are amice, alb, girdle, stole, maniple, chasuble (qq.v.). At other solemn services and in processions a cope (q.v.) is used. At choir offices and other occasions the clergy wear a surplice (q.v.), sometimes in the Eng. Church with the addition of a scarf and univ. hood. A stole is worn in the administration of the sacraments. The V. of the Oriental Rites differ somewhat from these (see **VESTMENTS, ORIENTAL ECCLESIASTICAL**). The use of the old V. in the Church of England is authorised by the *Ornaments Rubric* in the Prayer Book. See *A. Fortescue, Ceremonies of the Roman Rite*, 1917; G. Dix, *The Shape of the Liturgy*, 1945; H. Norris, *Church Vestments*, 1949.

Vestris, Lucia Elizabeth (*née* Bartolozzi) (1797-1856), grand-daughter of the famous engraver Francesco Bartolozzi. Well educated and possessing a splendid voice, she married Armand Vestris, the leading ballet dancer of his time. She appeared in opera in London and Paris, and was prima donna at Her Majesty's Opera House in the Haymarket. She was

famous for her many love affairs as well as her beauty, and particularly for her extremely shapely legs. She played at most theatres in London, at Drury Lane and the Haymarket, and was very popular as a singer at Vauxhall Gardens. Her most popular song was 'Cherry Ripe.' Later, she became actress-manageress and took over the Olympic Theatre, near Drury Lane, a curious playhouse built entirely from the timbers of captured French men-o'-war. There she made theatrical history by producing extravaganzas and burlesques which she mounted with great taste and beauty. She can be regarded as one of the pioneers of musical plays as they are known to-day. She had no financial sense, but could always get money which she lavished on her theatre. She later married Charles Matthews, and they became joint manager and producer. She ran Covent Garden Opera House, where her productions included *A Midsummer Night's Dream* with Mendelssohn's music. But financial misfortune dogged her and her husband, and she died in 1856 after a most disastrous season at the Lyceum. For many years she was the most talked-of woman in London, the toast of the town, and she did a great deal for the theatre at a time when theatrical taste was low.

Vestry, room in a church where the vestments and other movable ornaments are kept. Since they have generally been used for parochial meetings, some of these in the Church of England have also acquired the name of V.s. It is the duty of such meetings to provide funds for the maintenance of the edifice of the church, and public worship, and to elect churchwardens. Their conduct is regulated by common law and by a succession of Acts.

Vesuvianite, see IDOCRASE.

Vesuvius (It. *Vesuvio*), volcano in Campania, Italy, 9 m. E. by S. of Naples (q.v.). Its height varies by a few hundred ft. but averages 4000 ft. Monte Somma, the Mons Sumanus of the ancients, is a great semicircular girdle of cliff to N. and E., parted from the eruptive cone by the valley known as Atrio di Cavallo, and itself the remnant of a massive wall which once shut in the huge cone of prehistoric times. Lava, scoriae, ashes, and pumice-stone are the fabric of the mt, which during activity emits a large assortment of minerals, such as augite, magnetic iron, leucite, hornblende, and mica. The amazing fertility of its slopes, on which especially those grapes luxuriate from which the wine 'Lachrimae Christi' is made, explains why for over 25 cents. V., in spite of its constant menace, has been the heart of a densely populated region. The destruction on 24 Aug. AD 79, of the cities of Pompeii, Herculaneum, and Stabiae (qq.v.), and the death of the elder Pliny (q.v.), have cast an unfading glamour over that historic eruption. During those of 472 and 1631 particles of dust are said to have alighted in Constantinople. During that of 512 some may have reached Tripoli. Other years of remarkable activity were 1794, 1822,

1855, 1871, 1906, 1929, and 1944, the volcano never having been totally quiescent since AD 79. See F. A. Perrott, *Vesuvius Eruption of 1906*, 1924; G. Alfano and J. Friedlaender, *Die Geschichte des Vesuvius*, 1929.

Veszprém (Ger. *Weissbrunn*), tn of W. Hungary, cap. of V. co., in the Bakony Forest (q.v.), 60 m. SW. of Budapest (q.v.). The older part of the tn, once a fortress, stands on a steep rock. There is a fine neo-Romanesque cathedral (20th cent., on site of sev. previous structures), and an 18th-cent. baroque bishop's palace. The school of chemistry serves the surrounding mining dists., and there are textile and oil manufs., and an agric. trade. The tn was a centre of Hungarian resistance during the anti-Russian risings of Oct.-Nov. 1956. Pop. 22,000.

Vetch, see TARE.

Veterinary Science may be said to have begun in the Egyptian civilisation, and from the Egyptians' knowledge of the horse and its diseases the Greeks and Romans learnt much. The Rom. Vegetius (c. AD 300) left writings on the subject, which in the 16th cent. were much studied, and stimulated interest in the science, especially in France, where the first veterinary college was estab. at Lyons in 1762, and the second at Alfort near Paris in 1766. A Frenchman, St Bel, founded the Royal Veterinary College in London in 1790, and Liartard first estab. a college in New York.

Veterinary education in Great Britain and Ireland is provided by the univs. of Bristol, Cambridge, Edinburgh, Glasgow, Liverpool, London, and Dublin. The Licence to practise as a veterinary surgeon (M.R.C.V.S.) is now granted to veterinary graduates of the univs., but was formerly obtained on success in a series of examinations conducted by the Royal College of Veterinary Surgeons. There is no other qualification which entitles an individual to practise veterinary medicine and surgery and describe himself or herself as a veterinary surgeon, and the Veterinary Surgeons Act of 1948 provides that registration with the Royal College of Veterinary Surgeons is a *sine qua non* of practice as a veterinary surgeon. This Act provides that the Royal College of Veterinary Surgeons will continue to examine candidates for the higher qualification, the F.R.C.V.S. diploma. The R.C.V.S. is responsible for ensuring that adequate standards are maintained by the univ. schools. It also exercises disciplinary powers—comparable to those of the General Medical Council—over registered practitioners.

In modern times the most important function of the veterinary profession is the improvement of animal husbandry in all its aspects. This involves a knowledge of the proper selection of breeding farm animals, the management and feeding of herds and flocks, and the prevention of diseases. Recognition of disease in the interest of public health is of primary importance and diseases of animals communicable to man by contact or through the medium of milk or meat must without

delay be recognised by the veterinarian and measures applied with a view to eliminating danger to man and spread to other animals. Research institutes of the Ministry of Agriculture and appropriate depts of veterinary schools play an essential part in the recognition and prevention of animal disease. There is an increasing demand in the colonies for veterinary scientists to combat infectious diseases, especially rinderpest, which have devastated herds and caused large tracts of country to be uninhabitable. In private practice the veterinary surgeon, apart from the part-time duties of many as officials of the Ministry of Agriculture, is called upon to attend cases of animal suffering of all kinds. Small animal practice has assumed an increasing importance during the last half cent., and some veterinary surgeons, particularly women, are almost wholly engaged in it. Great strides have been made in this kind of practice, particularly in respect of anaesthesia, operative technique, X-ray diagnosis, preventive medicine, and euthanasia. Veterinary surgeons are also employed by the Royal Army Veterinary Corps, by some municipalities and animal welfare societies. But by far the greatest employer of veterinarians in Britain is the Ministry of Agriculture, Fisheries, and Food, which, besides a large full-time veterinary staff, also relies on the part-time services of practitioners to assist in diagnosis and eradication of certain animal diseases and allied duties.

See CAT; CATTLE; DOG; HORSE; PIG; POULTRY; SHEEP, etc.; CRUELTY TO ANIMALS ACT, 1876; DISEASES OF ANIMALS ACT; DISTEMPER; DOCKING; FARRIERY; FOOT AND MOUTH DISEASE; HUSK; LOUPING ILL; NAVICULAR DISEASE; PSTITACOSIS; RINDERPEST; ROUN.

Veto, term applied to the right of a king or other chief magistrate or officer to withhold his assent to the enactment of a law, or, generally, of one branch of the executive or legislature of a state to reject the bills, resolutions, or measures of other branches. The term originates in the power of the tribunes of the plebs of ancient Rome to declare their protest against any unlawful measure, which they did by pronouncing the word 'veto' (I forbid). In Great Britain the power theoretically belongs to the crown (see CROWN). In the crown colonies the governor exercises the power (see GOVERNOR, COLONIAL). In the Brit. Overseas Dominions the V. of the governor-general had fallen into desuetude even before the passing of the Statute of Westminster, 1931, and even before the status of the governor-general and of the state governor had been changed by the Imperial Conference (see on this GOVERNOR, COLONIAL; COLONIAL LAW). The position now (1958) is that the governor-general of a Dominion or the governor of a state is merely the queen's representative and has no power of reservation or, in other words, no power to V. a measure for 'repugnancy' within the meaning of the Colonial Laws Validity Act, 1865. The governor of an Australian

state, however, has the right, in effect, to V. a measure which violates the written constitution of the State. See also WESTMINSTER, STATUTE OF. The power of V. enjoyed by the House of Lords was reduced by the 1911 Parliament Act to 2 years, and by an Act of 1949 to 1 year. In the U.S.A., the president can V. a measure of Congress, but, notwithstanding his V., the measure becomes law if subsequently carried by a two-thirds majority of each house.

The Great Power V. has been the great problem of the U.N.; it nearly wrecked the San Francisco Conference (q.v.), for the Soviet formula had required that the 5 Great Powers must always be in agreement. Russia has exercised its right to stop majority decisions on numerous occasions. This is the great stumbling block to the practical functioning of the Council. See also UNITED NATIONS, CHARTER OF THE. See W. Koo, *Voting Procedures in International Political Organizations*, 1947; M. Maier, *Le veto législatif du Chef de l'État*, 1948.

Vetier, see VATTER.

Veurne, see FURNES.

Veuster, Joseph de, see DAMIEN, FATHER.

Vevey, tourist resort in the canton of Vaud, Switzerland, situated on Lake Geneva, 12 m. SE. of Lausanne. One of the chief buildings of interest is the church of St. Martin, in which is Ludlow's tomb. V. is also the scene of Rousseau's *Nouvelle Héloïse*. The chief manufs. are chocolate, machinery, watches, and infants' food. Pop. (1955) 14,700, Fr.-speaking.

Vexatious Indictments Act (1859), an Act passed to check a formerly unlimited right of private persons to prefer an indictment (q.v.) to a grand jury without any previous inquiry before magistrates. The Act was repealed by the Administration of Justice (Miscel. Provs.) Act, 1933, which, *inter alia*, abolished grand juries, amended the law as to the presentation of indictments, but did not affect certain statutory restrictions on the right to prosecute in particular classes of case.

Vexilla Regis, see HYMNS—Latin Hymnology.

Vexin, The, historic region of NW. France, on the r. b. of the Seine (q.v.), now comprised in the depts of Seine-et-Oise, Oise, and Eure (q.v.). By the treaty of St.-Clair-sur-Epte in 911 it was divided into the V. Normand, the cap. of which was Gisors (q.v.), and the V. Française, the cap. of which was Pontoise (q.v.). In the 12th-cent. struggles between the houses of Blois and Anjou, in which Henry II (q.v.) of England was involved, the V. Normand was the strategic key to Rouen. Geoffrey of Anjou (father of Henry II), under whom Anjou and Normandy were united, had ceded it to the King of France, but Henry regained it by treaty with Louis VII. John (later King of England) alienated the V. again in 1195 to Philip II of France; and Richard I had to build the great fortress at Les Andelys to replace the lost fortress and natural defences of the V. See F. M. Powicke, *The Loss of Normandy, 1189–1204*, 1913.

Veygoux, Louis Charles Antoine Desaix de (1768-1800), Fr. gen., b. Château d'ayat, near Riom, and educated at the military school founded by the Marshal d'Étamp. V. played a good part in Moreau's skillful retreat through the Black Forest, drove back the Archduke Charles at Rastadt, and for 2 months held the bridge of Kehl against his assailants. But the subjugation of Upper Egypt during Napoleon's campaign (1798-9) was the crowning distinction of his career. He d. of wounds received at the battle of Marengo.

Vézelay, Fr. vil. in the dept of Yonne, built on a high, isolated hill. It was important in the Middle Ages, and here St Bernard (q.v.) preached the Second Crusade to Louis VII. The 12th-cent. church of Ste-Madeleine is one of the finest monastic churches in France. Beza (q.v.) was b. here. Pop. 530.

Via Appia, see **APPIAN WAY**.

Via Flaminia, or **Flaminian Way**, was the great trunk road which led from Rome northward for 222 m. to Ariminum on the Adriatic. It was a famous thoroughfare for travel and for commerce alike, and there are many allusions to it in literature. A wayfarer leaving Rome would pass in turn through Oricoli, Narnia, Sangermini, Carsulae, Mevania, and Forum Flaminii. In time he would reach Nuceria and after ascending the pass over the Apennines would descend to Caes. Here his road bore round in a NE. direction, and he would finally reach Forum Fortunae on the coast, whence he would turn NW. through Pisaurum on to the busy port of Ariminum. Some of the paving stone and the bridges or, at least, their piers still remain *in situ*. It was built during the censorship of Flaminius (220 BC), whence the name.

Via Mala, gorge in the canton of Grisons, Switzerland, the original road being made about the year 1470, and the present one during the first half of the 19th cent. It is at the beginning of the Splügen road, is 4 m. long, and flanked by rocks about 1600 ft high. It crosses the Rhine 3 times.

Viadua, see **ODER**.

Viaduct, see **BRIDGE**.

Viana do Castelo: 1. Dist. of N. Portugal, in Mino prov. (q.v.). It has a coast-line on the Atlantic in the W., and is bounded by Spain on the N. and E. It is generally mountainous, and is crossed E.-W. by the fertile valley of the Lima. Area 814 sq. m.; pop. 274,532.

2. (Anc't *Velobriga*), city of Portugal, cap. of V. dist., on the Atlantic at the mouth of the Lima, 205 m. N. by E. of Lisbon. It has an anct fort and many fine old houses. There are important cod fisheries, and there are manufs. of carpets and foodstuffs. Pop. 14,000.

Viareggio, It. resort, in Tuscany (q.v.), on the Tyrrhenian Sea, 13 m. W. of Lucca (q.v.). It is a modern, well-laid-out tn, and has a good beach. There is a monument to Shelley (q.v.), whose body was cremated here. Pop. (tn) 37,000; (com.) 41,400.

Viaticum (Lat. 'provision for a journey'), a name for Holy Communion when given to a person in danger of death.

Viatska, see **KIROV**.

Viaud, Louis Marie Julien, see **LOTI, PIERRE**.

Vibo Valentia (until 1928, **Monteleone di Calabria**), It. tn, in Calabria (q.v.), 30 m. SW. of Catanzaro (q.v.). It was severely damaged in earthquakes in 1783 and 1805. There is a cathedral (17th-18th cents.) and a ruined castle. Silk and olive oil are manuf. Pop. 23,000.

Viborg: 1. Amt in N. central Jutland, Denmark; it includes the peninsula of Salling and the ls. of Fur in Lim Fjord. The S. is hilly, and the soil is rather poor. There is agriculture, mainly in the N., and dairy farming. Area 1,180 sq. m.; pop. 160,020.

2. Cap. of the above, 36 m. NW. of Aarhus. It is one of the oldest tns in Denmark, and has the largest granite church in Europe, founded in 1130, but completely restored in the 19th cent. The tn has been the seat of a bishop since the 11th cent., and in 1919 became the seat of the new High Court of Jutland. It suffered from successive fires in the 18th cent. V. has textile mills, tobacco factories, and breweries. Pop. 22,820.

Viborg, Russia, see **Vyborg**.

Vibration, see **RESONANCE**.

Vibrations, see **MASSAGE**.

Vibrio, generic term for certain bacteria of spiral form. See **BACTERIA**.

Viburnum, genus of deciduous and evergreen shrubs and trees (family Caprifoliaceae). *V. Opulus*, the guelder rose, is an ornamental Brit. shrub, with large white flower heads followed by pinkish berries which are eaten in parts of Europe. *V. tinus* is the *Launstrinus*. *V. Lantana* is the *Wayfaring tree*.

Vic-Wells, see **SADLER'S WELLS**.

Vicar. A V. strictly is one who holds a benefice as deputy of the rector, who may be a layman and receives a share of the emoluments of the incumbency. But commonly a V. is any incumbent who is not entitled to tithes (q.v.).

Vicary, Thomas c. (1495-1562), surgeon. At one time he practised in Maidstone, then went to London, where he was admitted a member of the Barbers' Company, being senior warden in 1528 and master in 1530. In 1535 he became sergeant-surgeon to Henry VIII, and also served Edward VI, Mary, and Elizabeth I. In 1540 the Barbers united with the surgeons to form the Barber-Surgeons' Company, of which V. became first master; he was re-elected to the mastership in 1546, 1548, and 1557. He was resident surgical governor of St Bartholomew's Hospital from 1548 until his death. His writings were unimportant, but his influence and reputation were great, and he used them to the advancement of his craft. His *Anatomic of the Bodie of Man* is said to have been first pub. in 1548; the edition of 1577 was reprinted in 1888, edited by F. J. and P. Furnivall; it includes a memoir. V.'s memory is perpetuated by an annual lecture on the

history of surgery at the Royal College of Surgeons of England.

Vice-President, next in rank to a president. As a rule the duties of a V.-P. are necessarily nominal or dormant. In the U.S.A. the V.-P. automatically becomes president on the demise of the president during the latter's term of office. His chief duty is as presiding officer over the U.S. Senate, in which, however, he has only a casting vote. He has no seat in the cabinet.

Vicente, or **Vincente**, Gil (c. 1465-1536?), Portuguese dramatist, b. Lisbon. He wrote over 40 plays, usually divided into autos, comedies, tragi-comedies; and farces which are full of vivacity and merry humour, and undoubtedly contain V.'s best work. This division, however, is subject to some criticism, because in his

being the *Coryciana*, ed. by Bloisius Palladius, Papal Secretary. His partner and punch-cutter was Lautizio de Bartolomeo del Rotelli, a Perugian goldsmith. By 1524 he was printing for the humanist poet Gian Giorgio Trissino—first to write blank-verse plays—who said of him, 'as in calligraphy he has surpassed all other men of our age, so . . . he has gone beyond all other printers,' a tribute given modern confirmation by Caslon, Garamond, and others in their discipleship. Other printing included 4 books (1526), without the aid of Lautizio, yet no example of V.'s holograph as *scrittore* can be found.

See *Il modo de temperare le penne* 2 eds. Victoria and Albert Museum, London; F. Warde's complete facsimile of *La operina* and *Il modo*, introduced by

*Segue la lo esempio delle bre che pono
ligarsi con tutte le sue sequenti, in tal mo-
do cioè
aa ab ac ad ae af ag ah ai ak al am an
ao ap aq ar as at au ax ay az*

THE CURSIVE LETTERS OF ARRIGHI VICENTINO

From *La operina*, in the collection of the late R. B. Fishenden.

works a minor type of play can be found, such as the morality. It has been alleged that Lope de Vega modelled his dramas on V.'s work. See *Four Plays*, 1920, and *Lyrics*, 1921, trans. by A. F. G. Bell. See also studies by A. F. G. Bell, 1921; A. J. Saraiva, 1943; A. B. Freire (2nd ed.), 1947.

Vicentino, Lodovico degli Arrighi (d. 1527?), prince of calligraphers, b. Vicenza. V. became writing-master in Venice before going to the Vatican as *scrittore de brevi apostolici*—apostolic brief writer. In 1522 he pub. the first manual of our written alphabet, *La operina da imparare di scrivere littera cancellarescha* (being a book of models of a current correspondence hand based upon the Apostolic chancery-script), which remains unsurpassed. Compressed into 20 pages, it is the fullest writing instruction known. In 1523 V. left Vatican service to produce in Venice his *Il modo de temperare le penne*, describing himself on one page as public notary. This work opens with 5 pages of the earliest use of calligraphic italic type which V. did not use again and has no further record. Returning to Rome, V. took up printing, the first off his press

S. Morison, 1926; P. Standard, *Calligraphy's Flowering, Decay, & Restoration*, 1947; A. Fairbank, *A Book of Scripts* 1949. On development of italic hand to printing, see S. Morison, *Type Designs of the Past and Present*, 1926.

Vicenza: 1. Prov. of Italy, in central Veneto (q.v.). It is generally low-lying, but the NW. of the prov. is in the Alps (q.v.). In the N. is the plateau of the 'Sette Comuni,' the chief of which is Asiago (q.v.), whose inhab. speak a Ger. patois. The chief riv. of the prov. is the Bacchiglione (q.v.). The prin. tns include V. and Bassano (qq.v.). Area 1075 sq. m.; pop. 610,000.

2. (Anc. Vicetia), It. city, cap. of the prov. of V., on the Bacchiglione, 38 m. WNW. of Venice (q.v.). It was the bp. of Palladio (q.v.), and the tn contains many splendid buildings by him: the Basilica, the Chiericati palace, the Olimpico theatre, and the Rotonda villa amongst them. There is a fine Gothic cathedral, now restored after being damaged during the Second World War. V. manufs. textiles, glass, machinery, and motor-car chassis. Pop. 83,000.

Viceroy, one who rules over a kingdom or country in the name of the king with regal authority. The title so far as Great Britain is concerned seems to be confined in recent hist. to the former V.s of India.

Viçetia, see VICENZA.

Vichy (-les-Bains), Fr. spa, cap. of an arron., in the dept of Allier, on the Allier. It acquired an unhappy notoriety during the Second World War, when it became the seat of the gov. headed by Marshal Pétain (q.v.) and Pierre Laval (q.v.). The waters of V. were known to the Romans; they are exported in large quantities. Pop. 29,100. See also FRANCE, History.

Viola, see TARE.

Vickers Ltd., a holding company owning, *inter alia*, all the shares in Vickers-Armstrongs Ltd. (formed in 1928) and jointly with Cammell Laird & Co. Ltd. the whole of the issued capitals of English Steel Corporation Ltd. and Metropolitan Cammell Carriage & Wagon Co. Ltd. The interests of the Vickers Group cover a very wide range, including shipbuilding and repairs, aircraft, steel production, engineers' tools, equipment for power stations, docks and harbours, mining, and cement-making plant, printing machinery, power presses, soap, paint, and ink-making machines, non-ferrous products, brewing, malting and distillery plant, optical and scientific instruments, rubber and plastic products, railway rolling stock, motor-bus bodies, punched-card accounting machinery, earth-moving equipment, armaments, constructional engineering, hydraulic pumps, and gears. The authorised capital in 1956 was £45m., of which £37,591,051 had been issued. The group has interests in Australia, S. Africa, India, Pakistan, and Canada.

Vickers Test, see METAL TESTING.

Vickerstown, see WALNEY ISLAND.

Vicksburg, co. seat of Warren co., Mississippi, U.S.A. It is an important cotton manufacturing centre and has also railroad shops, saw and lumber mills, canneries, and machinery works. The scene of an important siege and campaign of the Civil war, it contains National Cemetery with more than 12,000 graves of unidentified soldiers, and the V. National Park of 1300 ac. on the site of the great battle-ground of 1863. Pop. 28,000.

Vico, Giovanni Battista (1668-1744), It. philosopher, historian, and jurist, b. Naples, where he became prof. of rhetoric in the univ. (1698). In 1735 he was appointed historiographer to Charles III, King of Naples. His most important work is the *Scienza nuova* (revised ed. 1744), in which he studies and defines the imaginative faculty, and propounds theories on the nature of poetry, the origin of speech, etc., and anticipates the mod. theory of recurring cycles in history. This great work has been ed. by Fisch and Bergin (Cornell, 1949); Eng. trans by the same authors, 1944). V.'s complete works have been ed. by Nicollini and others (8 vols., 1914-42). See H. P. Adams, *The Life and Writings of Giovanni Battista Vico*, 1935. T. Berry, *The*

Historical Theory of Giovanni Battista Vico, 1949.

Vico, Lake, see VITERBO.

Victor, name of 3 Popes and 1 Antipope. **Victor I**, *Saint*, was Pope from c. 189 to c. 199. He may have been b. in Africa. He decided the Easter controversy. **Victor II** (*Gerhard of Eichstätt*), pope 1055-7, was a German. He vigorously asserted the independence of the papacy against the Imperial claims. **Victor III**, *Blessed* (*Dausferius* or *Desiderius*), Pope from 1086 to 1087, was b. at Benevento. He became abbot of the Benedictine monastery of Monte Cassino in 1057, and under him the abbey enjoyed its greatest distinction, both in sanctity and learning. **Victor IV** (*Gregory Conti*), antipope Mar.-May 1138, was the nominee of Roger of Sicily, and reigned in opposition to Innocent II. See POPES, LIST OF THE.

Victor, Perrin Claude, Duke of Belluno (1764-1841), Fr. marshal, b. La Marche (Vosges). He entered the Army in 1782, distinguished himself at Toulon (1793). He commanded in the It. campaigns of 1796-7 and 1799-1800, and won distinction at Marengo. He took part in the campaigns in Russia, Germany, and France.

Victor Amadeus, see SAVOY, HOUSE OF.

Victor Emmanuel I (1759-1824), King of Sardinia (1802-21), b. Turin. He commanded the Sardinian forces against the French (1792-6), who occupied all the continental possessions of his family. The first Peace of Paris (1814) restored to him Piedmont, Savoy, and Nice, and the second (1815) restored Genoa. He abdicated in favour of his brother, Charles Felix, in 1821 after a popular revolution.

Victor Emmanuel II (1820-78), King of Sardinia (1849-61) and of Italy (1861-78). He ascended the Sardinian throne on his father's abdication after the defeat at Novara (23 Mar. 1849). V. E. was a conscientious and capable ruler, and gave Cavour influential support. A new It. kingdom had been created by the end of 1860, and V. E. proclaimed king of Italy (26 Feb. 1861). In 1866 he wrested Venetia from Austria, and in 1870 occupied Rome. Between 1861 and the end of his reign V. E. showed considerable political skill in the handling of the crises with the papacy and resultant on the conduct of Garibaldi (q.v.). He became extremely popular, and proved a unifying influence in the new state. See also ITALY, History. See lives by Sir E. Dicey, 1882; C. S. Forrester, 1927.

Victor Emmanuel III (1869-1947), King of Italy, b. Naples, only son of the prince of Piedmont, later Umberto I. In 1896 he married Princess Elena of Montenegro. There were 5 children, Umberto and 4 daughters. He played some part in the entry of Italy into the First World War on the side of the Allies.

After the war his relations with Mussolini were distant, and he continued to direct It. foreign policy in its old course, but in the crisis which brought Mussolini to power, he ignored the advice of his ministers to disperse the Fascisti by force

and refused to sign the decree of martial law presented by his premier, Facta. After the 'March on Rome' (see under FASCISM; MUSSOLINI) he sent Mussolini a telegram offering him the premiership, and thereafter he allowed himself to become the figurehead and spokesman of the Fascist regime, though he unsuccessfully opposed Italy's entry into the Second World War on Germany's side. Later he tried to save what he could from the ruins. He escaped from Rome on 8 Sept. 1943, and reached S. Italy, which was under the protection of the Brit. and Amer. armies. He gave sincere support to Badoglio (q.v.), his new premier, and promised support to the Allies after Italy's surrender in Sept. 1943 (see ITALY, History). Reluctantly he ceded his royal powers to his son, Crown Prince Umberto, on 5 June 1944, and he abdicated formally in Umberto's favour on 9 May 1946, in a futile last-minute gesture which his advisers hoped would save the monarchy. V. E. d. in Alexandria, Egypt.

Victoria (Alexandrina Victoria) (1819-1901), Queen of Great Britain and Ireland and, from 1876, Empress of India, daughter of Edward Duke of Kent, fourth son of George III, by Victoria, daughter of the Duke of Saxe-Coburg. b. Kensington Palace. She became queen in 1837. She reigned longer than any previous monarch, proved herself a model for constitutional monarchy, and gave her name to a great period of Eng. history and social life.

Princess Victoria was strictly brought up by her mother; her tutors were chosen by her uncle, Leopold, later King of the Belgians. On her accession V. broke at once from the rule of her mother, and with tact and firmness eluded Leopold's attempts to influence policy. She then threw herself with the greatest zest into her new duties. Her confidential friend and adviser in these early days was Lord Melbourne, the Prime Minister. V. was soon to show that she had a will of her own. When Melbourne's ministry was defeated (1839), Sir Robert Peel was asked to form a gov. Peel stipulated, however, that the Queen's ladies of the bedchamber (all members of Whig families) should be dismissed, to which, against all advice, the Queen flatly refused to agree. She won, and Melbourne returned to office for another 2 years. In 1840 V. married her cousin, Prince Albert of Saxe-Coburg-Gotha (q.v.), and although at first she allowed him to take no part in state affairs, she soon came to rely almost wholly on his judgment. It was a very happy marriage. There were seven children: the Princess Royal married the Ger. Crown Prince; the second child and eldest son subsequently succeeded his mother as Edward VII. Alice became Duchess of Hesse-Darmstadt; Alfred, Duke of Edinburgh, later became Duke of Saxe-Coburg-Gotha; Helena married Prince Christian of Schleswig-Holstein; Louise married the Duke of Argyll; Arthur became Duke of Connaught, and Leopold, Duke of Albany, and Beatrice

married Prince Henry of Battenberg. The marriages of Victoria's children, and of their immediate descendants, have linked the Brit. royal family to practically every royal house in Europe. Difficult times were to follow: Peel, whom the Queen had grown to like, fell from office, and the Whigs brought in Lord Palmerston, whom Prince Albert disliked and distrusted. The Queen followed his lead, and there was constant friction culminating in Palmerston's dismissal in 1851 because he had acted without first consulting the Queen.

In 1861 Prince Albert d. of typhoid and overwork. For the rest of her life, that is for more than half her reign, V. nursed her tragedy, and though she worked laboriously at affairs of state, refusing to let the Prince of Wales relieve her of anything, for long she never appeared in public if she could possibly avoid it. Her 3 great ministers of this long period were Gladstone (q.v.), who addressed her, as she said, as if she were a public meeting, and whom she detested; Disraeli (q.v.), who was the perfect courtier, flattering his royal mistress and making difficult affairs of state appear simple and interesting; and Lord Salisbury (q.v.), the great Conservative leader. In 1876 the Queen was proclaimed Empress of India. In 1887 she held her first Jubilee, to be followed 10 years later by the Diamond Jubilee. This last period of her life was a sort of apotheosis, in which she was accepted as the living and apparently immortal symbol of Eng. greatness and Empire.

It is impossible to overstate V.'s influence. She had immense character and will-power, but no great intellect. As a girl she had received the Crown when it was in disrepute. She reigned for 63 years, and she left it as a symbol of public honour and the highest private virtue. Her happy family life, her sympathy with simple people, her tragic widowhood and retirement, her great courage (in her old age she sent out the word in the dark days of the Boer war that 'The Queen is not interested in the possibility of defeat'), her glorious return in the evening of life, all caused her to be regarded with great veneration and have given her a place in hist. which nothing can belittle. Though the days of personal royal rule were ended beyond revival, V. refused to abate her remaining constitutional privileges—a amongst them a particular care for foreign policy, and there were repeated battles over Palmerston's habit of taking action first and informing his sovereign afterwards. She demonstrated by example the place which the Crown could fill in Eng. political life and as a link of the commonwealth, and estab. a tradition of work and service to the nation.

V.'s letters were ed. by Viscount Esher and G. Buckle, 1907-30, and her *Journal of Our Life in the Highlands* by A. Helps, 1868. See lives and studies by Sir R. R. Holmes, 1897; L. Strachey, 1921; Lord Ponsonby, 1933; E. F. Bruston, 1935; E. Sitwell, 1936, 1948. See also T. H. Ward (ed.), *The Reign of Queen Victoria*,

1887; E. Gosse, *Character of Queen Victoria*, 1901; Sir T. Martin, *Queen Victoria as I knew her*, 1908; Lord Esher (ed.) *The Girlhood of Queen Victoria*, 1912; C. Jerrold, *The Early Court of Queen Victoria*, 1912, and *The Married Life of Queen Victoria*, 1912; Sir F. Ponsonby, *Sidelights on Queen Victoria*, 1930; P. Guedalla, *The Queen and Mr Gladstone, 1845-98*, 1933, and *Idylls of the Queen*, 1937; S. J. Marriott, *Queen Victoria and her Ministers*, 1933; F. Hardie, *Political Influence of Victoria, 1861-1901*, 1935; Sir G. Arthur, *Concerning Queen Victoria and her Son*, 1943; A. Cecil, *Queen Victoria and her Prime Ministers*, 1953.

Victoria, Tomás Luis de (c. 1548-1611), Sp. composer, b. Avila, studied probably with Escobedo at Segovia, and in 1565 received a grant from Philip II to go to Rome the next year. He took holy orders there and became a singer in the Ger. College, and in 1571 choirmaster. In 1587 he became chaplain to the dowager empress Maria, who returned to Spain in 1581, and whom he followed about 2 years later, becoming choirmaster in the Madrid convent in which she lived. V. is as great a polyphonic master in the Sp. school as his contemporaries Palestrina, Laeuss, and Byrd were in the It., Flem., and Eng. He wrote 19 masses, 2 Requiems, 45 motets, and much other church music.

Victoria, state of the Commonwealth of Australia (a.v.), in the S. of the continent, between the 34th and 39th parallels of S. latitude and the 141st and 150th meridians of E. longitude. It is bounded on the N. and NE. by New S. Wales, from which it is separated by the Murray R., on the W. by S. Australia, and on the S. and SE. by the S. Ocean, Bass Strait, and the Pacific Ocean. The area is 87,884 sq. m., or only about one-thirty-fourth part of the whole continent; pop. 2,832,623 (estimated at 31 Dec. 1956). The pops. of the 4 chief cities are: Melbourne (cap.), 1,524,111; Geelong, 80,000; Ballarat, 48,030; and Bendigo, 36,918.

Physical Features. The state is traversed with more or less regularity throughout its length from E. to W. by a chain of mts and lesser hills, completely dividing it into 2 parts, and known as the Dividing Range. The streams to the N. of it flow towards the Murray R. and those to the S. towards the sea. The E. part of the range, dividing the Gippsland dist. from that of the Murray, is called the Australian Alps; and that part which separates the co. of Ripon from that of Borung is called the Pyrenees. Snow covers the higher peaks for sev. months of the year. The mountainous country is densely wooded to the summits with fine timber, but the peaks above the winter snow-line are bare or only partially covered with dwarfed trees or shrubs. For some 200 m. from Kilmore eastward the mts are steep, but have been made accessible by good roads; westward from Kilmore the range rapidly dwindles and, though there are points of considerable height, such as Mt William and Mt Macedon, is easily crossed. That

portion of the Murray basin commencing at Woolonga and extending in the form of a triangle to a width of 200 m. along the W. boundary of the state is almost flat. The remaining country N. and S. of the Dividing Range and its spurs is undulating and in some parts destitute of timber, in others closely wooded. Besides the main Dividing Range, there are other ranges extending in different parts of the country, some of them being spurs of the main chain. V. has a climate far more congenial to Europeans than any other state in Australia. It is never severely oppressive, except during the prevalence of hot northerly winds: these occur only at infrequent intervals in the summer. Droughts in V. are neither so general nor so continuous as in sev. of the other states, though, in certain dists., serious inconvenience and loss have been experienced at times on account of deficient rainfall. The gov., therefore, promoted national irrigation schemes upon a large scale, and these are now under the administration of the State Rivers and Water Supply Commission. Fruit-growing has been especially facilitated by these systems. Eildon Reservoir, on the Goulburn R., has a water storage capacity of 2½ million ac. ft and is one of the largest earth dams in the world.

Production and Industry. The main industry is grazing and agriculture, 5,511,843 ac. being under cultivation in 1956-7. The chief products are wheat (1,565,220 ac.), oats (612,587 ac.), hay (781,952 ac.), and barley (345,282 ac.). In 1954-5 there were 45,757 ac. devoted to the culture of vines, producing 1,612,000 gall. of wine, and 54,042 tons of raisins and currants. A large area is under orchards, and vegetables, tobacco, hops, and olives are also grown. The dairying industry is becoming increasingly important, and 90,676 tons of butter were produced in 1955-6. V. normally exports about half her total butter production annually. Livestock at 31 March 1957 included 25,830,544 sheep, 2,765,049 head of cattle (dairy and other), 258,336 pigs, and over 107,850 horses. The wool produced in 1955-6 amounted to 273,356,000 lb. (greasy), valued at some £A69,020,000. There are enormous deposits of brown coal, and the main beds in the Latrobe Valley are estimated to contain 22,000,000,000 tons suitable for open cast working. In 1956, 38,846 fine oz. of gold were yielded, valued at £A606,968. The chief exports, other than wool and gold, are grain and flour, butter, hides and skins, meats, live-stock, leather, milk and cream, and tallow. In 1955-6 exports were valued at £A209,555,000. There is also a depot trade in wool, tea, textiles, timber, tobacco, and sugar. In 1956 there were 16,053 factories, employing 355,185 persons, with an annual output of £A1,201,392. The chief imports are textiles and apparel, woollens, tea, timber, paper, oils, machinery, and iron. Imports in 1955-6 cost £A299,349,000. Melbourne does over 90 per cent of the overseas trade; the other principal ports being Geelong, Portland, and Warrnam-

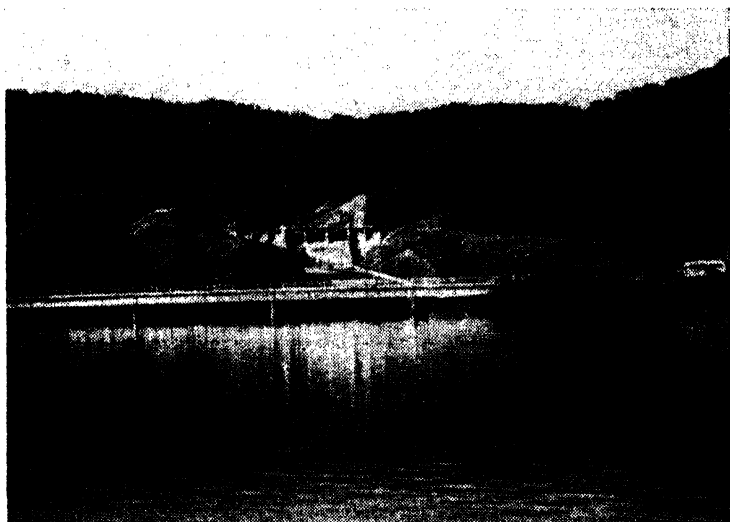
bool. The chief manufs. are: woollens, clothing, etc.; food, drink, and tobacco; bricks, stone, and glass work; furniture; rubber goods, drugs, and chemicals; tanning and fellmongering. Hydro-electric power is increasingly used. The great Kiewa project was begun in 1937.

Communications. Melbourne is connected with Sydney, Brisbane, Adelaide, and Perth by railway. The railways in V., with the exception of small lines, are all state-owned. The number of m. open for traffic in 1956 was 4449.

Education. Educational establishments in V. are of 4 classes: the univ. with 5

preparatory section is associated with every technical school. There are also private or church technical schools; V. has also 2 agric. colleges and a school of horticulture.

Government. The gov. of V. consists of a governor appointed by the Crown, a Legislative Council or Upper House of 34 members, and an Assembly or Lower House of 65 members. The Constitution was estab. by an Act of the Victorian Legislature of 1854. The Adult Suffrage Act of 1908 placed women on an equality with men as electors. A very complete system of local self-gov. exists in V. The



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EILDON RESERVOIR, VICTORIA

In the background is the spillway of the new Eildon Dam, which has a capacity of 2,750,000 acre feet.

affiliated colleges, for superior education; state schools for primary and secondary education—the system of primary public instruction, which was commenced in 1873, is secular and attendance at school is compulsory for children between the ages of 6 and 14, and state instruction is granted free of cost; registered schools, for primary and secondary education, run by the churches or in private hands; and technical schools, for instruction in the various arts. The Melbourne Univ. was estab. under a special Act of the Victorian Legislature in 1853; affiliated to it are Trinity, Ormond, Queen's, and Newman Colleges, connected with the Church of England, Presbyterian, Methodist, and Rom. Catholic Churches respectively, and the Univ. Women's College. There are 35 state-aided technical schools (1950), and a full-time day junior technical or

municipalities are either cities, tns, bors., or shires. Each dist. is a body corporate with a common seal. In 1948 there were 35 cities, 5 tns, 20 bors., and 137 shires. There is a supreme court with a chief justice and 7 puisne judges; courts of general and petty sessions, co. courts, courts of mines, court of licensing, and children's courts.

Early History. Capt. Cook and the officers and crew of the *Endeavour* were, probably, the first Europeans to sight the country, though no landing was attempted. On his report that the E. part of Australia was suitable for colonisation, a party of convicts was sent out in 1785 under Capt. Arthur Phillip, R.N., and on the shores of Port Jackson, N. of Botany Bay, Phillip estab. a permanent settlement. Later, Hume and Hovell travelled overland from Sydney, and the outcome

of their report was that a convict estab. was founded on W. Port Bay. This settlement was soon abandoned, and the first permanent settlement in V. was formed at Portland Bay by Edward Henty, from Van Diemen's Land (Tasmania), who landed on 19 Nov. 1834 and thereafter began agric. and stock-breeding operations and also whaling. Other settlers followed, but no marked development ensued in this vicinity, owing to the want of good land and of safe harbourage. The cap. was founded by 2 Tasmanian parties, one led by John Batman, who landed on 29 May 1835, the other by John Pascoe Fawkner, who reached the site of Melbourne on 28 Aug. of the same year. Others from the same is. and from Sydney followed, bringing stock with them, and penetrated farther into the interior. Among these was Maj. (later Lt.-Col. Sir) Thomas Mitchell, who was so impressed with the economic potentialities of the country, the greater part of which was still unknown, that he named it Australia Felix. His reports, coupled with the success of the earliest settlers, stimulated the interest of existing Australian settlers and of the mother country, and one immediate result was that large herds of sheep and cattle were driven overland from New S. Wales to occupy the best pasturage land in V., and shiploads of emigrants began to arrive from the U.K. Regular gov. was first estab. under Capt. Wm Lonsdale, who was sent from Sydney to take control, and landed on 29 Sept. 1839. On 2 Mar. 1840 Sir Richard Bourke, the governor of New S. Wales, visited it and named the cap. Melbourne. Charles La Trobe was appointed superintendent, which title was in 1851 changed to that of lieutenant-governor, when the colony was separated from New S. Wales and named V. Gold was discovered soon afterwards and led to a further influx of pop., but the ensuing and oppressive mining regulations resulted in rioting on the Ballarat (q.v.) goldfield in 1854. A new Constitution giving responsible gov. to the colony was proclaimed on 23 Nov. 1855.

See H. G. Turner, *History of the Colony of Victoria* (2 vols.), 1904; J. W. Gregory, *Geography of Victoria*, 1907; N. L. Hall, *Victoria's Part in the Australian Federation Movement, 1849-1900*, 1931; A. Pratt, *Centenary History of Victoria, 1834, and Victoria: the first Century* (Official History of Victoria), 1934; A. J. and J. J. McIntyre, *Country Towns of Victoria: a Social Survey*, 1944; G. W. Leeper (ed.), *Introducing Victoria*, 1955; the ann. *Victorian Year Book*.

Victoria: 1. Cap of Brit. Columbia, on the S. end of Vancouver Is., overlooking the strait of Juan de Fuca, separated by 82 m. of sea from the city of Vancouver on the mainland. Founded by the Hudson's Bay Co., in 1843, and named in honour of the young Queen, it became the cap. when the colony of Vancouver Is. was estab. in 1849. Upon the union of Vancouver Is. with Brit. Columbia in 1866 it ceased to be the cap., to which status it was restored in 1868. V.'s dominating

architectural feature is the imposing Parliament buildings, attached to which are the prov. reference library and the important prov. museum of natural hist., Victoria College (affiliated with the univ. of Brit. Columbia), and the Dominion Astrophysical Observatory, one of the largest in the world. V. is a residential and tourist centre, but there are nevertheless some industries, including ship-building, lumbering, saw-milling, flour-milling, and canning. Pop. (1956) 52,935, with Greater Victoria 123,033.

2. Seaport shipping coffee, cocoa, etc., and manganese, 400 m. NE. of Rio de Janeiro, the cap. of Espirito Santo, Brazil. Pop. 21,900.

Victoria, cap. and port of Hong Kong (q.v.). It is situated between a range of treeless hills of volcanic rock and the extensive harbour of Hong Kong and extends for 9 m. along the N. shore of the is. A large proportion of V., particularly in the central dists., was built in the early days of the colony, and runs up the steep hillside for hundreds of yds in narrow stepped streets or terraces. The chief industries of V. are cotton manufs., sugar, cement, paint, preserved ginger, tobacco and matches, rope works, food canning, rubber goods, electrical and light metal wares. St John's Cathedral, seat of the diocese of Victoria and S. China, was heavily damaged in the Second World War. The pop. of V., including the Peak, is about 1,000,000.

Victoria, Lake, or **Victoria Nyanza**, known formerly to the Arabs as **Ukarewe**, largest lake of Africa. Area 26,828 sq. m.; 255 m. long and 155 m. broad; altitude, 3726 ft. The water is highest in July and lowest in Nov., the extreme range being 43½ in. As a fresh-water lake it is in size second only to Lake Superior. L. V. is situated on the equator and forms the chief reservoir of the Nile, which leaves the lake at Ripon Falls, at Jinja, where a great hydro-electric scheme has been commenced. There is an important fishing industry (12,000 tons, 1955). A marine service for passengers and cargo is maintained with great efficiency between 6 lakeside ports. The N. part lies in Uganda, the S. in Tanganyika Ter., and a small area in the W. of Kenya Colony.

Victoria amazonica (synonym *regia*), **Queen Victoria**, or **Royal Water Lily**, aquatic plant (family Nymphaeaceae), native of S. Amer. rivs. It has a thick, fleshy root stock, and huge tray-like leaves from 6 to 12 ft in diameter, green above and purple or violet beneath. The flowers are very large and fragrant. It is grown in tanks in stove-houses.

Victoria and Albert Museum, S. Kensington, London, one of the world's greatest museums of fine and applied art, mainly of the post-classical periods. It originated in the Museum of Ornamental Art at Marlborough House in 1852, and in 1857 merged in the collective S. Kensington Museum, where various collections of science and art were assembled. The original aims of the art sections of the museum were both educational and academic, and the appeal to both scholars

and the general public has always been maintained. The original buildings were continually being enlarged in the 19th cent., and by 1909 Aston Webb's final extension was completed. The whole museum was renamed V. and A. in 1899, and in 1909 this name was restricted only to the art collections, which were then parted from the science collections and became the present separate museum. The museum now consists of 11 departments: those of Architecture and Sculpture; Ceramics; Engraving, Illustration, and Design; Library; Metalwork; Paintings; Textiles; Woodwork; Indian Section; Circulation (dealing with travelling exhibitions, etc.); and Museum Extension Service (for inquiries, photographs, lectures, etc.). Outstations are Bethnal Green Museum, Ham House, Osterley Park, and Apsley House. The galleries are arranged in 2 groups: the primary collections, arranged by style and period; and the study collection, arranged by materials, for the use of the scholar and the student. The museum is under the Ministry of Education.

Victoria Channel, 4 m. SW. of Formby Point, Lancs, England, leading into Crosby Channel, and the best entry to the R. Mersey.

Victoria Cross, highest Brit. decoration for 'conspicuous bravery or devotion to the country in the presence of the enemy.' It was founded by Queen Victoria towards the conclusion of the Crimean War (1856) and has been cast from the metal of Russian guns taken at Sevastopol, save for brief periods during the two World Wars. It consists of a Maltese cross made of bronze, bearing in the centre the royal crown surmounted by a lion, and with the scroll superscribed 'For Valour.' The winning of the V.C. carries with it a pension of £10 per annum, which can under special circumstances be made up to £75. A Royal Warrant of 1920 extends eligibility to women of military nursing services and to civilians of either sex when serving under naval, military, or air authorities.

The awards up to 1956 number 1346, including 3 bars (awarded to Capt. A. Martin-Leake and Capt. N. G. Chavasse, both of the R.A.M.C., and to Capt. C. H. Upham of the New Zealand military forces). The number of V.C. awards made during the First World War was 633. Of this number 173 were posthumous awards. The number of V.C. awards made during the Second World War was 182, of which 82 were posthumous awards.

The distribution of forces awards has been as follows: U.K., Royal Navy 118, Army 865, R.A.F. and R.F.C. 31; Australia, 87; Canada, 80; Fiji, 1; India, 111; New Zealand, 21; S. Africa, 28. The awards to civilians number 4.

See Sir O'M. Croagh and E. M. Humphris, *The Book of the V.C.*, 1924; R. Stewart, *The Victoria Cross*, 1928; K. Hare-Scott, *For Valour*, 1949.

Victoria Falls, The (native name *Mosi-oa-tunya*, 'smoke that thunders'), great waterfalls upon the R. Zambezi,

in Rhodesia, Central Africa, 900 m. from the sea, discovered by Livingstone in 1855. Above the falls the riv. flows over a level stretch of basalt and is flat and broad, dotted with thickly wooded is. At this point it is some 1860 yds wide, and then drops over a chasm extending the whole breadth and varying from 250 to nearly 400 ft. Its course is impeded by an opposite wall, nearly as high, the water escaping through a channel of 100 ft width through the 'Boiling Pot,' into the Grand Cañon, now spanned by a splendid bridge. In 1938 a hydro-electric station, with a capacity of 2000 kW, was started up and a supply of electricity was provided for the Livingstone Municipality.

Victoria Lake, or Zor-kul, or Sarykul, lies at an altitude of 13,400 ft on the SE. Pamirs, in the Tajik S.S.R. It is a vestige, gradually diminishing in size, of a prehistoric period of glaciation.

Victoria Land, named after Queen Victoria, was discovered in 1841 by Capt. James Clark Ross. It is a region of the Antarctic lying between 180° and 150° E. long. Ross followed its margin as far as 78° 4' S. lat. Here are situated Mt Erebus (volcanic) and Mt Melbourne (8337 ft). V. L. is the area of the 'heroic' age of polar exploration under Scott and Shackleton (qq.v.). See also ROSS SEA SECTOR.

Victoria Palace, theatre in Victoria Street, London. It was opened in 1911 on the site of the old Royal Standard as a music-hall to seat just under 2000. In May 1935 it was opened as a regular theatre under Seymour Hicks's management and is now owned by Moss Empires Ltd. It is now regarded as almost the permanent home of the famous 'Crazy Gang' shows.

Victoria University, The, Manchester, in Oxford Road, owes its existence principally to John Owens (q.v.), a Manchester merchant who d. in 1846 and who left a sum of over £96,000 for the foundation of a college in which instruction would be given 'in such branches of learning and science as are usually taught in the English universities.' Owens College was opened in a house in Quay Street in 1851. Growth was rapid, and by 1873 the first of the present buildings, designed by Waterhouse, was in occupation. In 1880 a charter was granted for the institution of the Victoria Univ., with its seat in Manchester. Four years later the colleges of Liverpool (q.v.) and Leeds (q.v.) were admitted, and the Federal Univ. continued until 1903, when a new charter was granted and separate univs. were estab. in the 3 cities. To-day the univ. contains 9 faculties, and the original Owens College is surrounded by additional buildings containing the Whitworth Hall, Christie Library, the Manchester Museum, and the many depts of learning. There are over 5200 students.

Victorian Order, The Royal, see ORDERS OF KNIGHTHOOD, GREAT BRITAIN AND IRELAND (8).

Victoriaville, tn of Quebec, Canada, 59 m. N. of Sherbrooke. The prin. industries are manufs. of clothing and furniture. Pop. 14,200.

'Victory,' Brit. battleship of 2164 tons, launched at Chatham on 7 May 1765, flies the flag of the commander-in-chief at Portsmouth. She was the flagship of Howe at the relief of Gibraltar (1782), of Hood at Toulon (1793), and of Nelson at St Vincent (1797) and Trafalgar (1805). The *Victory* is now at Portsmouth. She is maintained in a state of preservation by the Victory Fund, and is open to the public.

Victory Medal. The institution of this medal was decided upon by the Associated Powers in Mar. 1919, and its name in all Allied countries is 'Victory Medal' and the ribbon is identical, consisting of 2 rainbows joined by red in the centre. It was also agreed that the medal should be made of bronze and that the design should be as nearly as possible identical for each nation. On the reverse are the words 'The Great War for Civilisation' (in various languages). The V. M. was awarded to all officers and men who entered a theatre of war on the strength of any military unit or, in the navy, all officers and men who had been afloat on duty between Jan. 1914 and Nov. 1918, extended in 1920 to include the N. Russian, Siberian, and Caucasian operations. Awards exceeded 5,000,000.

Victualling, see RATION.

Victualling Bill, see BILL OF VICTUALLING.

Vicuña, or Vicugna (*Lama vicunia*), small ruminant related to the camels, native of Bolivia and N. Chile. Its soft silky fur or wool is brown in colour, and much valued for the manuf. of choice fabrics.

Vicus Aquensis, see BAGNÈRES-DE-BIGORRE.

Vidalin, Jón (1666-1720), Icelandic theologian and Lat. poet, Bishop of the S. diocese. For eloquence as a preacher he is unrivalled in the hist. of the Icelandic church until the advent of Haraldur Niésson (q.v.). *See* Arne Möller, *Jón Vidalin og hans Postil* (in Danish).

Vidalin, Páll (1667-1727), Icelandic lawyer and sub-governor of the country, cousin of Bishop Vidalin, both of them grandsons of Arngrímur Jónsson (q.v.). Together with Árni Magnússon (q.v.), he wrote the colossal *Jarabók*, which, however, remained unpub. until the 20th cent. It gives a minute description of every farm in the country (there was then no town in Iceland) and details of the livestock. He was a philologist and one of the foremost poets of his time.

Vidisa, see BHILSA.

Vidyasagar, see ISWAR CHANDRA.

Viebig, Clara (1860-1952), Ger. novelist, b. Trier. She first became famous for portraying the influence of the bleak landscape of her native region, the Eifel, on the inhab., as in her novels *Kinder der Eifel*, 1897, *Das Weibsdorf*, 1900, *Das Kreuz in Venn*, 1908. Later novels are set in a background of modern Berlin, where she settled and married. *See* C. Scheffler, *Clara Viebig*, 1926.

Vieille-à-roue, see HURDY-GURDY.

Vieira, Antonio (1608-97), Portuguese missionary, b. Lisbon. He was educ. by

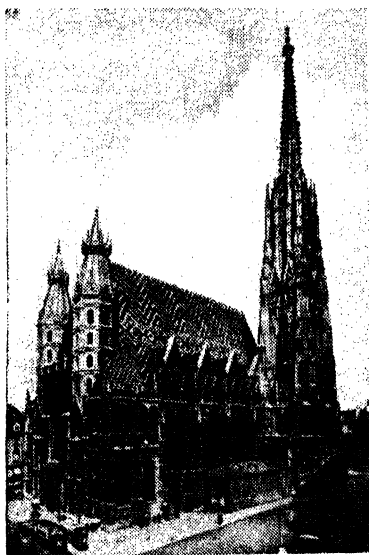
the Jesuits at Bahia, Brazil, and entered the Society in 1625. He did much to better the lot of the Indians of Brazil, and obtained the prohibition of slavery.

Vienna (Ger. *Wien*), Austrian city, cap. of the Rep., and until 1916 cap. of the Empire. With the exception of the dist. of Floridsdorf it lies on the r. b. of the Danube, a canalised arm of which also intersects the city. To the W. and SW. are the beautiful, wooded hills called the Wiener-Wald.

History. On the site of a Celtic settlement the Romans built a garrison town called Vindobona, in which Marcus Aurelius (q.v.) is said to have d. The place passes out of history during the barbarian invasions, but it reappears as 'Wenia' in 881, and in 1137 'Wienn' is mentioned as 'civitas.' In 1137 also Henry Jasomirgott (*see under AUSTRIA*) made it his cap. Under the Babenbergs (q.v.) V. became a commercial centre, and the Babenbergs kept a brilliant court and encouraged the arts (Walther von der Vogelweide, q.v., began his poetical career there). In 1278 V. became the cap. of the Hapsburgs (q.v.), and hence, in time, the seat of the German emperors. By the end of the 14th cent. the city had a univ. and many fine churches and monasteries. It was ravaged by fire in 1525, and was unsuccessfully besieged by the Turks in 1529 and 1683. It was a centre for the Counter-Reformation, and, after the defeat of the Turks, there was a period of rapid expansion. Many palaces (e.g. Schwarzenberg), churches (e.g. Karlskirche), and other buildings were constructed in sumptuous Baroque style. Under Maria Theresa (q.v.) V. was the brilliant centre of a great empire, and it continued into the 19th cent. as the 'Alt-Wien' of tradition. In the second half of the 19th cent. the pop. increased rapidly, particularly in the new industrial suburbs, there was much building activity, and the city was extensively replanned and modernised. In 1878 the students and industrial workers led a revolution and was quickly suppressed. The aftermath of the First World War caused considerable suffering in the city, and the Social Democrat municipality launched an ambitious programme of social reform. V. was among the first cities in the world to build modern blocks of flats for workers. The unsettled state of the country, however, led to sev. risings and clashes between rival parties. From Mar. 1938 until April-May 1945 V. was occupied by the Germans, and was an integral part of Germany as the cap. of the 'Ostmark' (q.v.). During the occupation of Austria, after the Second World War, the city was supervised by a 4-power authority, appointed by the U.K., the U.S.A., France, and Russia. V. gives its name to sev. treaties and gatherings: the Concordat (1448) between the Pope and Frederick III (q.v.); the Treaty of 1689 (*see GRAND ALLIANCE*); the Peace of 1809, after Napoleon's defeat of Austria (also called the Peace of Schönbrunn); the Congress (1814-15) for the settlement of Europe, following the

downfall of Napoleon; the Treaty of 1804 (see SCHLESWIG-HOLSTEIN).

V. *To-day*. Although in the ter. of Lower Austria (q.v.), V. is a separate prov. itself, and it is the seat of a Rom. Catholic archbishop and of a Protestant bishop. It consists of an anct inner city and 26 dists. (*bezirke*). The old ramparts which enclosed the inner city were levelled in 1860, and in their place was constructed a boulevard, the Ringstrasse, which is one of the finest streets in the world. The inner city contains most of the remarkable institutions and buildings: St Stephen's cathedral (12th-16th cents.),



'Donauland' Vienna

ST STEPHEN'S CATHEDRAL, VIENNA

now restored after suffering severe damage in 1945; the Hofburg (13th-19th cents.), the former Imperial palace; the great opera-house, reopened in 1955 after rebuilding necessitated by the disastrous fire of 1945; the palaces of the archbishop and nobility, and many notable churches. V. has a univ. (1365) with a renowned medical faculty, and there are technical and veterinary colleges, museums, libraries, art galleries, and sev. parks, including the celebrated Prater (6½ sq. m.), which is beside the riv. in the E. of the city. It has long been renowned as a musical centre, and has connections with Gluck, Haydn, Mozart, Beethoven, Schubert, Bruckner, Brahms, Strauss, Hugo Wolf, and Gustav Mahler (qq.v.).

After the dissolution of the Austrian Empire during the First World War (see

under AUSTRIA V. remained the chief commercial city in SE. Europe, although suffering some diminution of trade. Since the Second World War its commercial importance has been prejudiced by the restrictions on traffic between E. and W. Europe. Among the prin. manufs. are silk, velvet, linens, carpets, ceramics, jewellery, mathematical, scientific, and musical instruments, watches, fine cutlery, chemicals, leather goods, furniture, paper, and meerschaum pipes. Pop. 1,616,100. See D. A. Fischer, *Vienna: the Town and its Buildings*, 1946.

Vienna, Congress of. A congress of European statesmen held in 1814 after Napoleon's exile to Elba, to settle the peace of Europe. Before the deliberations of the congress had ended, Napoleon escaped from Elba and landed in France.

Vienna Art Museums. The Art-Hist. Museum in Maria Theresa Platz was originally the Imperial Gallery formed by Ferdinand I, brother of Charles V of Spain, who succeeded the latter as emperor of the Holy Rom. Empire. All the Imperial collections, paintings, sculpture, antiquities were regrouped in the *Kunsthistorisches Museum*, inaugurated in 1891, a further regrouping being completed in 1936, making the picture section comparable with that of the National Gallery, the Louvre, and the Prado. In the early Dutch masters the gallery is rich, particularly the work of Joost van Cleve, Mabuse, Jacob Cornelisz, Jan van Eyck, Memling, and Hugo van der Goes. Here also are paintings by Ter Borch, Jan van der Capelle, Brouwer, Van Goyen, Ruysdael, Jan Steen, Pieter de Hooch, and Rembrandt—the latter is represented by 8 pictures, including that of his son Titus. There is a famous series of pictures by Brueghel, the best of his work in any gallery, not excluding even Belgian galleries. Other great Flem. painters represented are Rubens with his immense 'Festival of Venus', 'St Ambrose and the Emperor Theodosius', and 'Ignatius casting out Devils'; Van Dyck, and Jordaens. The wonderfully elaborate 'Trinity' of Dürer is one of the outstanding works in Vienna and also here are his 'Young Venetian Woman' and a 'Madonna and Child'. Other Ger. masters follow, including Holbein with portraits of Jane Seymour and John Chambers. Eng. art is represented by Hogarth, Reynolds, and Gainsborough. The Viennese gallery is strong in Venetian and other It. schools. Here are Titian's most dramatic picture, 'Ecce Homo', some of his finest portraits, including his daughter Lavinia; Tintoretto with his 'Susanna and the Elders'; Palma Vecchio; Paris Bordone, and Giorgione, with his unforgettable 'Three Philosophers'. Among the works of later It. artists are the pagan and voluptuous 'Io' and 'Ganymede' of Correggio; Parmigianino's (Parmigiano) 'Cupid Shaping his Bow'; Raphael's 'Madonna al Verde'; Fra Bartolommeo's 'Presentation in the Temple'. Though the museum buildings were damaged in the War, the pictures were safe in the salt-mines of Upper Austria, and a handsome

selection was shown in London in 1949. Also in Vienna is the Lichtenstein collection, which is notable for its pictures by Rubens and Van Dyck alone, and the superb Albertina collection of old Master drawings (originally formed by Albert Casimir of Saxony (1738-1822).

Vienne: 1. Dept of W. central France, formed in 1790 out of the larger part of Poitou (q.v.), and of part of Touraine and Berry (qq.v.). V. is flat and low-lying, and is drained from N. to S. by the R. V. (q.v.) and its trib. the Clain. Cereals, fruit, and some hemp are grown, and stock is raised. Poitiers (q.v.) is the cap., and there are 3 arrons., Poitiers, Châtellerault (q.v.), and Montmorillon. The dept has numerous megalithic monuments. Area 2720 sq. m.; pop. 313,950.

2. Anct Vienna, Fr. tn and arron. in the dept of Isère (q.v.) on the R. Rhone (q.v.), 16 m. S. of Lyons. Once the cap. of the Allobroges (q.v.), V. became a Rom. colonia under Caesar c. 47 BC, and many traces of the Rom. occupation can be seen. The most notable Rom. building is the temple of Augustus and Livia, built by Claudius. During the 5th and early 6th cents., and again at the end of the 9th and the beginning of the 10th cents., V. was the home of the Burgundian kings. Between c. 450 and 1790 it was the seat of an archbishop; the church of St Maurice (11th to 16th cents.) was once the cathedral. The church of St Pierre was rebuilt in the 9th cent.; it houses the Musée Lapidaire. V. has woollen and metal manufacturing industries. Pop. 20,000.

3. Riv. of France, which rises in N. Corrèze, and flows N. and NW. past Châtellerault, Limoges, and Chinon, to join the Loire 8 m. SE. of Saumur (qq.v.). Length 230 m.

Vienne, Haute-, dept of France, formed of parts of the anct provs. of Limousin, March, Poitou, and Berry. It is very hilly, the riv. Vienne flowing between the Marche Mts in the centre of the dept, and the Limousin Mts in the S. Agric. is not well developed, but some cereals and hemp are grown, and there is considerable breeding of livestock. Uranium, wolfram, manganese, and kaolin are found. There are important porcelain, leather, paper, and textile industries. The prin. tns are Limoges (the cap.), Bellac, and Rochechouart (qq.v.). Area 2119 sq. m.; pop. 324,450.

Vientiane, administrative cap. of Laos (q.v.), standing on l. b. of R. Mekong (q.v.). Once cap. of independent Thal kingdom. V. was sacked by Siamese invaders in 1827 and its people dispersed. Chosen as the seat of the Fr. Resident of Laos in 1899, the tn began to grow again with the building of European-style villas and streets. Traces of the old city still remain, and there are ruins of some 24 temples. To-day the administrative cap., it houses foreign embassies and aid missions, and has an airport. Communications are difficult except by air. There is no railway. No recent pop. figures are available. See also VIET NAM; HO CHI MINH. See P. Devillers,

Histoire du Viet Nam, 1952; J. Sainteny, *Histoire d'une Paix Manquée*, 1953; E. Hammer, *The Struggle for Indo-China*, 1954, with supplement, *The Struggle for Indo-China Continues*, 1955; B. Fall, *The Viet Minh Regime*, 1955.

Vierlande, see BERGEDORF.

Viersen, Ger. tn in the Land of N. Rhine-Westphalia (q.v.), 17 m. W. of Düsseldorf (q.v.). It was badly damaged in the Second World War. Textiles, foodstuffs, machinery, and paper are manuf. Pop. 37,000.

Vierwaldstättersee, see LUZERN, LAKE OF. **Vierzon**, Fr. tn and dist. in the dept of Cher, on the Cher. It was severely damaged in the Second World War. It is a railway junction, has iron-works, and manufs. porcelain, agric. machinery, and glass. Pop. 26,000.

Viet Minh, abbreviation for 'Viet Nam Doo Lap Dong Minh Hoi' (League for the Independence of Viet Nam), a Communist-led Vietnamese nationalist organisation. The V. M. was founded in 1941 at a congress of Vietnamese nationalists convened by Ho Chi Minh (q.v.) in Tain Tai in the Chinese prov. of Kwangsi. It was headed by Ho Chi Minh, and during the Second World War collaborated with the Allies in carrying out underground resistance against the Japanese occupying Viet Nam. In 1945, after the Jap. surrender, the V. M. declared Viet Nam (q.v.) an independent rep. and estab. a gov. at Hanoi (q.v.). When negotiations between the V. M. and France broke down in 1946 the former resorted to open warfare against the Fr. forces in Tonkin, and the fighting continued until 1954. Although the V. M. was absorbed in the Lien Viet, a broad union of political groups, in 1946, the Communist-led resistance movement continued to be known as V. M. After the Geneva conference in 1954 the V. M. assumed control of N. Viet Nam, which is to-day known as the Democratic Rep. of Viet Nam.

Viet Nam, independent country of SE. Asia, now divided into 2 self-governing halves at the 17th parallel. The ter. comprises Tonkin, Annam, and Cochinchina (qq.v.), and is bounded to the N. by China, to the W. by Laos and Cambodia, to the E. by the China Sea, and to the S. by the Gulf of Siam and the China Sea. The length of V. N. from N. to S. is slightly less than 1000 m., but the greater part is mountainous. Almost all the inhab. live in the Red R. delta (see RED RIVER) of Tonkin, the Mekong delta (see MEKONG) of Cochinchina, and the coastal strip of Annam. The mts, which lie to the N. and W. of the Red R. delta and which run from N. to S. along the W. side of Annam, are sparsely inhabited by backward tribal peoples, Nung, Man, Mol, etc. V. N. is affected by the monsoons, and the N. part experiences violent typhoons from the China Sea in autumn. Temp. varies considerably from N. to S., particularly during winter, when Tonkin is frequently cold and damp, the thermometer registering only a few degrees above freezing-point. The people are Vietnamese, with minorities of tribal peoples

in the mts and Chinese in the cities. The prin. language spoken is Vietnamese, a monosyllabic language with 6 tones and incorporating a large number of Chinese words. The second language, spoken by most educ. Vietnamese is Fr., but strenuous efforts are being made by the Vietnamese to replace it by English. The national poem of V. N. is the Kim Van Kieu (q.v.) of Nguyen Du (q.v.). Physically, the Vietnamese are short and slight, with yellow skins and mongoloid features. They are believed to have migrated from S. China into Tonking, where they settled.

The Vietnamese kingdom has been known by a number of different names during its hist. (e.g. Van-Lang, Giao-Chi, etc.), but, for the sake of clarity, is here referred to as V. N. throughout. It was conquered by China in 111 BC, and remained under Chinese domination until AD 939, when it regained independence. In 1413 it was again occupied by China, but only until 1427. From the 11th cent. onwards the Vietnamese pushed steadily southwards until, by the end of the 18th cent., they had occupied the ter. of Champa (q.v.) completely and taken part of Cambodia (q.v.). By 1780 the occupation of the ter. comprising modern V. N. was completed. The country was governed by an emperor through mandarins, and the emperor continued to send tribute to China until the 19th cent. About 1600 the country split into 2 halves, Tonking and Cochinchina, each ruled by a Chua or temporal king, the emperor having become merely a religious head. The Tay-Son rebellion in 1771 overthrew the 2 Chuas, but the Tay-Son were themselves defeated by the heir of the Chua of Cochinchina, who enlisted the aid of foreign soldiers, mainly Fr. This man, Gia Long, reunited V. N. and became emperor in 1802. France intervened about the middle of the 19th cent., making Cochinchina a Fr. colony in 1867 and Tonking and Annam Fr. protectorates in 1884. During the Second World War V. N. was occupied by the Japanese, who, before leaving the country, granted it independence. After the Jap. surrender, N. V. N. was temporarily occupied by Chinese troops and S. V. N. by Brit. troops. When the French returned to assume control, V. N. claimed to be independent. A confusing series of military operations and conferences ensued, culminating in the outbreak of full-scale war in 1946. Three main parties were involved in this war, the French, the Viet Minh (q.v.), and the non-Communist Vietnamese nationalists who fought against the Viet Minh or remained neutral, but who never ceased to claim independence for V. N. This war ended in the costly defeat of the Fr. and nationalist troops at Dien-bien-phu (q.v.), and the signing of agreements on the future of Fr. Indo-China at the Geneva conference of 1954. In accordance with these agreements V. N. was divided into 2 parts at the 17th parallel, the N. being handed over to the Viet Minh and the S. to the nationalists. France has now withdrawn her troops, while N. V. N. has

become the Democratic Rep. of V. N. (see VIET MINH; HO CHI MINH) and S. V. N. the Rep. of Viet Nam (see NGO DINH DIEM). An International Truce Supervisory Commission ensures peace between the 2 govs. The Democratic Rep. of V. N. is closely linked to Russia and China, while the Rep. of V. N. receives aid and technical assistance from the U.S.A.

No recent pop. figures are available for V. N., but the inhab. are estimated to number 25,000,000. For industries, agric. products, etc., see ANNAM; TONKING; COCHIN-CHINA.

See also C. Maybon, *Histoire Moderne du Pays d'Annam*, 1920; P. Huard and M. Durand, *Connaissance du Viet Nam*, 1954; G. Taboulet, *La Geste Française en Indochine* (2 vols.), 1955-6; Lê Thanh Khôi, *Histoire du Viet Nam*, 1955.

Viet Nam, Democratic Republic of, the whole of Viet Nam (q.v.) N. of the 17th parallel. It is administered by the Communist gov. of President Ho Chi Minh (q.v.), and its cap. is Hanoi (q.v.).

Viet Nam, Republic of, the whole of Viet Nam (q.v.) S. of the 17th parallel. It is administered by the republican gov. of President Ngo Dinh Diem (q.v.), and its cap. is Saigon (q.v.).

Vigan, Le, Fr. tn, cap. of an arron., in the dept of Gard, on the Arre. It has a fine Gothic bridge. Silk, hosiery, and wine are manuf., and there is a small coalfield near by. The chevalier d'Assas (q.v.) was b. here. Pop. 3700.

Vigée Le Brun, Marie Louise Elizabeth, see LEBRUN.

Vigeland (Adolf) Gustaf (1869-1943), Norwegian sculptor, b. Oslo. His symbolical naturalism (in which he followed Rodin) profoundly influenced and virtually monopolised Scandinavian sculpture for nearly half a cent. Many of his most remarkable works are in the Frognerpark at Oslo. This park contains a vast collection of V.'s figures, his conscious attempt to express every aspect of the human spirit in stone. He is said to have been the most prolific sculptor of all time.

Vigevano, It. tn, in Lombardy (q.v.), 16 m. NW. of Pavia (q.v.). It has a cathedral (partly 10th cent.) and a palace, upon the construction of which Leonardo da Vinci (q.v.) is said to have been employed. There are textile and leather industries. Pop. 38,000.

Vigfússon, Guðbrandur (1828-89), Icelandic scholar, graduated from Copenhagen Univ.; was appointed reader in Scandinavian at Oxford in 1884. Besides editing with F. York Powell classic Scandinavian poetry in the *Corpus Poeticum Boreale*, 1883, and a number of Icelandic classics and sagas, he compiled an *Icelandic-English Dictionary*, 1866-73, new ed. 1956, with supplement by Sir William Craigie.

Vigil, a day of preparation before a great festival. In the early Church the V. was the night before a festival, and was spent in watching and prayer. In 1956 Pius XII abolished most V.s in the Rom. Catholic Church. The Anglican Book of Common Prayer orders 16 of them to be

observed among the days of fasting and abstinence.

Vigilance Associations protect and help women and young girls. The Brit. Vigilance Association (founded as The National Vigilance Association in 1885) in collaboration with the International Catholic Girls' Society promotes travellers' aid work. At St Martin-in-the-Fields Church, London, a hospitality bureau for foreign girls has been organised in conjunction with 'The Friends of the Island,' and an information leaflet for the foreign worker and visitor to England is issued. The bureau carries out many inquiries for foreign voluntary societies regarding the placing of girls in Eng. households on a domestic or *au pair* basis, pen friends, employment agencies, hotel and boarding-house accommodation, employment offers, etc. There are several autonomous branches of the Association, including the Liverpool Vigilance Association, which runs a port counselling service, and meets all boats from Ireland. The National Vigilance Association of Scotland, founded in 1910, does similar work.

The International Bureau for the Suppression of Traffic in Persons was founded in 1899 as the International Bureau for the Suppression of Traffic in Women and Children, to study this problem in its international aspects and to secure national and international legislation which would prevent sexual exploitation of women and children by third-party vested interests. Branches of the International Bureau exist in many countries, and close liaison is maintained. The League of Nations undertook a world-wide study of traffic in women in 1927, which resulted in close co-operation between many countries through international conventions designed to punish those who exploit the prostitution of others. The last convention considered by the U.N. (which carries on the work of the League in this field) was adopted by the General Assembly in Dec. 1949.

Vigilius, name of one Pope. *Vigilius* was Pope from 538 to 555. He was elected at the instance of Justinian, emperor of the E. Under pressure from the Emperor, V. gave his support to the doctrine of the 'Three Chapters.'

Vignola, correctly **Giacomo Barozzi da Vignola** (1507-73), It. architect, b. Vignola near Modena, designed the Villa Papa Giulio, the church of Il Gesù, and some other churches—all in Rome; also the palace or castle of Caprarola. He worked in France 1541-3, and compiled 2 important books on architecture and perspective.

Vigny, Alfred Victor, Comte de (1797-1863), Fr. poet, b. Loches (Indre-et-Loire). He came of a military family, and served in the Army for 12 years. He pub. his first vol. of poems in 1822, followed in 1826 by his famous prose romance *Cinq-Mars*, and by *Poèmes Antiques et Modernes*, including *Motse and Le Cor*. In 1835 appeared his drama of *Chatterton*; amongst his other dramatic work may be mentioned: *Quilte pour la Peur*, and *Shylock*, an adaptation of *The*

Merchant of Venice. *La Mort du Loup*, *La Maison du berger* and *Le Mont des Oliviers* were written between 1843 and 1844, and included in the collection entitled *Les Destinées*, 1864, and pub. posthumously, as was his *Journal d'un Poète*, 1867. V.'s poetry is notable for its grandeur and starkness, and for its constant theme of suffering. He saw man as a pigmy, with a God entirely uninterested in his suffering, and evolved a stoic philosophy as humanity's only solace and solution. He was elected to the Fr. Academy in 1845. See E. Estève, *Vigny, sa pensée et son art*, 1923; P. Flottes, *A. de Vigny*, 1925, and *Pensée politique et sociale de Vigny*, 1927; F. Baldensperger, *A. de Vigny*, 1933; G. Bonnefoy, *La pensée religieuse et morale de Vigny*, 1946; P. G. Castex, *A. de Vigny, l'homme et l'œuvre*, 1952.

Vigo, Sp. seaport in the prov. of Pontevedra, standing on a fford, the Ria de V., on the Atlantic coast. It was attacked by Drake unsuccessfully in 1585 and was plundered by him in 1589. In 1702 a Brit. and Dutch fleet under Rooke (q.v.) sank Sp. and Fr. ships in the fford and took £1m. of Amer. treasure. V. is the prin. port in Spain for transatlantic traffic. It has 2 anc. castles and an old fishing quarter, but it is, in general, a well-planned modern tn. There are important fisheries, and shipbuilding and metallurgical industries. Paper, sugar, leather, soap, brandy, and flour are manufactured. Pop. 140,000.

Viiipuri, see **VYBORO**.

Vijayanagar, or **Hampi**, 34 m. from Bellary (q.v.) in Andhra State, India, is the site of the famous ruined city of V. Founded in AD 1336, it was the seat of the Hindu V. kings, who ruled much of S. India, till 1565, when at the battle of Talikota the Muslims of the Deccan inflicted a shattering defeat on the Hindus. So complete was the rout, in which the V. king Ratta Raya was killed, that no serious attempt was made to defend the city. The ruins, which lie on the S. bank of the Tungabhadra R., cover 9 sq. m., and though the city was thoroughly looted, many splendid buildings remain, notably the so-called King's or Ladies' Bath, the Elephant Stables, the huge image of Narsingh Avatar, and the great Siva Temple.

Vijayawada, see **BEZWADA**.

Viking Art. Fine wood-carving, tools beautifully engraved with interlaced linear design, and finely wrought personal ornaments in gold and silver are typical of the art of the Vikings. In England it did not in any sense replace that of the Saxons (see **SAXONS**), and it is not until the latter part of the 10th cent. that its influence becomes at all marked. In the period of the raiding expeditions, the subsequent period of colonisation, and the time of the Dan. wars, there is little beyond a few brooches, many of the characteristic tortoise form worn in pairs on the shoulders, pins, and other small objects of bone and ivory.

It is usual to recognise 3 styles in Viking art. The *Jellinge* style, named from a

Dan. royal grave in Jutland, is based on heavy animal designs, of which the Great Beast, to be seen on the famous Jellinge rune-stone itself, is one variety. In Britain the style is well represented on the 14½-ft-high standing cross in Gosforth (q.v.). (Cumberland) churchyard.



Guildhall Museum: Library Committee of the Corporation of London

VIKING GRAVE SLAB (WIDTH 24 IN.) WITH RUNES, FROM ST PAUL'S, LONDON

An elaborate foliage ornament and interlacing are to be noticed in the *Ringerike* style, named after the dist. in Norway where it is well represented, carved in the local sandstone. But one origin of the style can be found in the Winchester school of illuminated MSS. A particularly interesting example of it may be seen in a rune-inscribed slab, part of a tomb, found in St Paul's churchyard in 1852 and now in the Guildhall (City of London) Museum; this early 11th-cent. sculpture of a 'Great Beast' and serpent, originally coloured, is the most notable relic of the Vikings in Britain. Another noteworthy relic of the same style and date is a bronze plate, part of a weather-vane, found at Winchester and now in the Cathedral Library. Influence of the Ringerike style is well represented in Eng. MSS., and there are also a few exceedingly competent carvings in ivory.

The carving on the wooden doors of Urnes church on the Sognefjord, Norway, gives its name to the Urnes style, though the distribution in Scandinavia is wider than the name might suggest. It found brilliant exposition in Irish metalwork (e.g. the Cross of Cong, (q.v.)), and it had an equally important place in Eng. Christian art. It is, says Dr T. D. Kendrick, leading Brit. authority, 'a permissible background of Northern taste, and (differs from) the Jellinge and Ringerike styles in that whereas these were distinctively and nationally Viking, Urnes was in its limited world an international and orthodox Christian art.' See T. D. Kendrick, *Late Saxon and Viking Art*, 1949 (chapters x, xi, xii). For the

earlier historic background, see R. H. Hodgkin, *A History of the Anglo-Saxons*, 1939 ed. (chapters xiii-xvi).

Vikings, see NORSEMEN.

Vikramaditya, legendary king of Ujjain (Malwa) in India who is associated with the Vikram Samvat, the Hindu era which commenced in the spring of 57 bc. No ruler of that date is historically traceable, the era having been for long called the Malava era (from Malwa). Its change of name may have been due to Chandragupta II, surnamed V. (a surname assumed by various kings), the Gupta ruler who conquered Ujjain about AD 390.

Vila Nova de Portimão, see PORTIMÃO.

Vila Real: 1. Dist. of N. Portugal, in Trás-os-Montes e Alto Douro prov. (q.v.). It is bounded on the N. by Spain, and on the S. by the Douro (q.v.). It is generally mountainous. There are many vineyards, producing chiefly port wine. Area 1636 sq. m.; pop. 317,370.

2. Tn of Portugal, cap. of V. R. dist. and of Trás-os-Montes e Alto Douro prov., on the Corgo, 190 m. NNE. of Lisbon. It has a medieval church and sev. old houses. There is a trade in port wine, and there are pottery manufs. Pop. 8000.

Villa, in the archaeology of Rom. Britain, a self-supporting country house with an attached farm, worked with slave labour and generally owned by Romanised Britons. Subsidiary industries, e.g. fulling and metal-working, were sometimes carried on. V.s were common in the lowland zone of Rom. Britain, though rare in the highland zone, where conditions were less settled and peaceful. Some were built on sites of earlier Belgic farms, especially in SE. Britain. Though showing many variations of size and plan, V.s may be generally divided into 3 prin. types. Most are of the 'winged corridor' type: the corridor extended along the front of the house with projecting rooms at each end, and often with 1 or 2 rows of rooms behind. Examples are found at Callow Hill and Ditchley in Oxfordshire. The largest V.s were of the 'courtyard' type, often formed by additions to an earlier building, as at North Leigh, Oxon. The third type was the 'basilican' comprising a rectangular building divided by 2 rows of posts into a nave and 2 aisles; rooms were formed by the use of internal partitions. Most V.s had hypocaust heating, and many had baths. Tessellated pavements and plastered and painted walls were common. The authoritative account is by Prof. I. A. Richmond, *Roman Britain*, 1955, Chapter iii (Polcan History of England). For a recent excavation, see G. W. Meates, *Lullingstone Roman Villa*, 1955. For distribution, see *Map of Roman Britain* (Ordinance Survey, 3rd ed. 1956).

Villa Borghese, see BORGHESE, VILLA.

Villa de Cerro Largo, see MELO.

Villa de Cura, see CURA.

Villa-Lobos, Heitor (1887-), Brazilian composer, b. Rio de Janeiro. He began by touring as a pianist and collecting Brazilian folk music, took to composition,

and in 1915 gave his first concert of works of his own at Rio. From 1922 he studied for a time in Paris with a gov. grant, and in 1931 he was appointed director of musical education in the schools of Rio. The catalogue of his work is enormous, and includes 5 operas, 14 ballets, 9 works entitled *Bachianas Brasileiras* and 18 called *Chôros* for various instrumental combinations, church and choral music, masses of orchestral works, many with vocal or instrumental solos, chamber music, piano works, and songs.

Villa Maria, tn of Argentina, in the prov. of Córdoba, on the Bartolomé Mitre and San Martín Railway, 343 m. from Buenos Aires. It trades in grain, timber, and dairy produce. In 1872 it was nominated by Congress as Federal cap. Pop. 34,000.

Villach, Austrian tn in the prov. of Carinthia, on the Drau. It has a fine 14th-15th-cent. church, a Renaissance tn hall, and other interesting old buildings, including a house once occupied by Paracelsus (q.v.). V. has a thermal spa, is the centre of the timber trade with Italy, and has iron, cellulose, and lead manufs. Pop. 30,100.

Villafranca, It. tn, in Veneto (q.v.), 7 m. SW. of Verona (q.v.). An armistice was signed here between France and Austria in 1859 after the battle of Solferino (see FRANCE, History). Pop. 11,000.

Villahermosa (formerly San Juan Bautista), city of SE. Mexico, cap. of Tabasco state, on the Grjalva R., 30 m. from the Gulf of Mexico. Bricks, tiles, soap, candles, and cigars are made. There is an airfield. Pop. 25,110.

Villani, Giovanni (c. 1275-1348), It. chronicler, b. Florence. He spent some time in travel. From 1316 he held various responsible offices in Florence. His *Historie Fiorentine* or *Cronica Universale* begins with biblical times and comes down to 1348, and gives a valuable account of the early hist. of Florence. It was continued by Matteo V, his brother, and Matteo's son, Filippo V, who take the chronicle down to 1364. There are Eng. trans. of portions, by R. E. Selfe, 1906.

Villanueva y Geltru, Sp. tn in the prov. of Barcelona, on the Mediterranean. It has textile mills, and manufs. tyres. Pop. 20,000.

Villarrica, tn of Paraguay, cap. of the dept of Guaira, second city of the rep. It is on the main line of the Central Paraguayan Railway, 90 m. from Asunción. Its chief products include tobacco, yerba maté, sugar, cotton, etc. There are sugar refineries, saw-mills, and flour-mills. Pop. 31,000.

Villars, Claude Louis Hector, Duc de (1653-1734), marshal of France, b. Moulins. He served in the Dutch wars and also helped the elector of Bavaria against the Turks, and in 1702 defeated the margrave of Baden at Friedlingen. In 1709 he was sent to command the main army opposing Eugene and Marlborough on the N. frontier, but was wounded at Malplaquet. He was at the head of the last army France could raise, and

saved his country by his victory at Denain (1712), when he fell upon the British and Dutch under Albemarle and drove Prince Eugene under the walls of Brussels, negotiating the peace of Rastatt (1714). His *Memoirs* were ed. by the marquis of Vogüé, 1884-92.

Villefranche-de-Rouergue, Fr. tn, cap. of an arron., in the dept of Aveyron, on the Aveyron. It has iron foundries, and a live-stock mrkt. Belle-Ile (q.v.) was b. here. Pop. 9300.

Villefranche (-sur-Saône), Fr. tn, cap. of an arron., in the dept of Rhône, on the Saône. It was the anct cap. of Beaujolais (q.v.). It is a centre of the Burgundy wine trade, manufs. textiles, and has a cattle mrkt. Pop. 20,000.

Villegas, Francisco, see QUEVEDO.

Villehardouin, Geoffroi de (c. 1160-c. 1213), Fr. historian, b. Aube. He took part in the Fourth Crusade, and was present at the capture of Constantinople in 1204. His *Histoire de la Prise de Constantinople par les Français et les Vénitiens* is an extremely valuable record of the events of the crusade. There is an Eng. trans. of the *Chronicles* by Sir F. Marzials in Everyman's Library, 1908.

Villein. In feudal law, V.s were those who held land by base or servile tenure; villeinage existed in England from about the 11th to the 14th cents. Legally a V. was bound to his native manor and all his earnings were his lord's. He held no property of his own. His corn had to be ground at his lord's mill, his loaves baked in his lord's oven. A payment (*marcchet*) had to be made to his lord when he married off his daughter, and a fine paid to his lord when he sold an animal. His lord could claim a V.'s best animal as heriot at his death. A V. and all his family could be sold to another owner, though it is unlikely that a V. would in practice be removed to another part of the country; generally such transfers meant only a change of lordship. However, a lord might voluntarily enfranchise a V.: in theory a V. could not buy his freedom, but in practice this did occasionally happen. If a V. lived for a year and a day in a chartered bor. he could claim his freedom. A V. on crown land could estab. his right to protection in the royal courts of law. See also FEUDALISM; FRANKLEDGE.

Villemarqué, see LA VILLEMARQUÉ, THÉODORE, CLAUDE HENRI HERSART, VICOMTE DE.

Villena, Enrique de (1384-1434), Sp. writer and scholar, reputed to be a wizard. He pub. *Arte de Trobar*, a treatise on poetry; *Los Trabajos de Hércules*, a pedantic allegory; *Arte Cisoria*, a handbook on the pleasures and fashions of the table; *Libro de Ojamiento*, a dissertation on the evil eye and its effects; and the first trans. of the *Aeneid* and the *Divine Comedy* into Spanish. After his death John II ordered his books to be destroyed.

Villeneuve, Pierre Charles Jean-Baptiste Silvestre (1763-1806), Fr. sailor. At the age of 15 he entered the Navy, was rapidly promoted, and in 1796 attained the rank of rear-adm. In the battle of

the Nile he commanded the rear of the fleet and escaped with 2 ships and 2 frigates to Malta. In 1804 he was in command of the Toulon squadron, and in 1805 was defeated and taken prisoner off Cape Trafalgar (see TRAFALGAR, BATTLE OF). In 1806 V. was liberated and returned to France.

Villeneuve (-sur-Lot), Fr. tn, cap. of an arron., in the dept of Lot-et-Garonne. It has preserving industries. Pop. 17,100.

Villeroi, François de Neuville, Duo de (1644-1730), Fr. soldier, the son of Marquis de V., marshal of France. He was brought up with Louis XIV, with whom he was a favourite, and in 1693 rose to be marshal of France. But he showed great incapacity in the Netherlands, 1695-6, and in 1701 was defeated and taken prisoner by Prince Eugene in Italy. He was again defeated by Marlborough at Ramillies, 1706, after which he was made governor of Lyons and died in Paris.

Villers-Bocage, tn in the dept of Calvados, France, about 12 m. SW. of Caen. On 13 June 1944 began the battle of V.-B. between the 7th Armoured Division ('Desert Rats') and the 4th Coy. of London Yeomanry on the one side, and a Ger. armoured div. equipped with Tigers and Panthers, which drove into the tn from another direction. The Brit. force was forced to withdraw after suffering severe losses. It was some time before V.-B. was recaptured by Brit. troops, and in the interval there took place the pattern bombing which greatly increased the destruction. Pop. 600.

Villers-Cotterêts, Fr. tn in the dept of Aisne, 17 m. SW. of Soissons. An important ordinance of Francis I (q.v.) from here in 1539 regulated the administration of justice. It was from here that Foch launched the attack that broke the Ger. front in July 1918 (see WORLD WAR, FIRST). There is a castle built by Francis I. Dumas, Père (q.v.) was a native. The forest of V. covers some 30,000 ac. Pop. 3500.

Villiers, Alan John (1903-), Australian sailor and travel writer, b. Melbourne. At the age of 15 he went to sea as a cadet, and thereafter spent much of his life in sailing ships. With the 4-master *Pamir* he twice won the grain race from S. Australia to England. During the Second World War he held the rank of lieutenant-commander R.N.V.R. and was awarded the D.S.C., and in 1957 he captained the *Mayflower II*, a replica of the original ship of the Pilgrim Fathers, on a commemorative voyage across the Atlantic. His books include *Falmouth for Orders*, 1929, *By Way of Cape Horn*, 1930, *The Cruise of the 'Conrad'*, 1937, *The Quest of the Schooner 'Argus'*, 1952, for which he was awarded the Portuguese Camoens Prize, and *The Way of a Ship*, 1953. *The Set of the Sails*, 1949, is autobiographical.

Villiers, Barbara, see CLEVELAND, DUCHESS OF.

Villiers, George, see BUCKINGHAM.

Villiers, George William Frederick, see CLARENDON, FOURTH EARL OF.

Villiers de l'Isle-Adam, Philippe Auguste Mathias, Comte de (1840-89), Fr. writer, b. Brittany. He gained a reputation as a satirist and a poet, but later wrote mostly in prose. Among his works are: *Isis*, 1862, *Morgane*, 1862, *Le Nouveau Monde*, 1876, *Contes cruels*, a fine vol. of short stories, 1883, 1886 (Eng. trans. Hamish Miles, *Sardonic Tales* 1927); and the drama *Axel*, 1890 (Eng. trans. by H. P. R. Finberg, 1925). V. is a master of the story of mystery and terror. See M. Daireaux, *V. de l'Isle-Adam, l'homme et l'œuvre*, 1936.

Villon, François (1431-c. 1485), Fr. poet, b. of poor parents in Paris, real name probably Montcorbier. He called himself Villon after a priest who became his benefactor. At an early age he became a student in arts, and by 1452 had taken his M.A. degree. After this little is known of him until 1455, when he was sentenced to banishment for killing a priest in a street brawl: 1456 saw him again in trouble, and the following year he was accused of being the ringleader of a gang of burglars, and sentenced, with others, to be hanged. Having appealed, he was banished and went to Roussillon in Dauphiné, but in 1461 he was caught at his old practices and imprisoned at Meung-sur-Loire. Being released, he was promptly involved in a street quarrel and again arrested and condemned to be hanged, but the sentence was commuted to banishment (1463). From this time V. passes from hist. He was the author of *Grand Testament*, 1456, *Petit Testament*, 1461, and some 40 or 50 short pieces, chiefly ballades, notably *Ballade des Dames du Temps Jadis*, *La Grosse Margot*, *Ballade des Femées*, *Ballade pour sa Mère*, and *Regrets de la Belle Heaulmière*, which occur mainly in the body of his *Grand Testament*. His 2 books of verse remain among the great treasures of Fr. poetry. It was V. who perfected the ballade and rondeau. V. was all things by turns in his poetry—witty, sardonic, gay, mocking, plunged into the utmost despair, penitent, and at times deeply religious. His artistic sincerity and spontaneity have set him among the great poets of the world. The best modern eds. of V.'s poems are those of Paul Lacroix, Pierre Jannet, Longnon, 1892 (revised by J. Foullet, 1932), Moland, 1893, H. de Vere Stacpoole, 1913, and G. Atkinson (with trans.), 1930. See P. Champion, *François Villon sa Vie et son Temps*, 1913, 1932; D. B. Wyndham Lewis, *François Villon: a Documented Survey*, 1928; L. Wharton (trans.), *Poems of François Villon*, 1935; L. Cons. *Etat présent des études sur Villon*, 1936; Cecily Mackworth, *François Villon*, 1948.

Vilna, see VILNIUS.

Vilnius (Polish Wilno, formerly Russian Vil'na), city in E. Europe, cap., economic and cultural centre of Lithuania. It has engineering, woodworking, and light industries, and many old crafts are practised. It is an important railway junction (5 lines). V. is the seat of the Academy of Sciences (1941) and a univ. (founded 1578 as a Jesuit academy, univ.

1803, abolished 1832, re-estab. 1919). It has many outstanding architectural monuments of the 14th-19th cents. Known since the 12th cent., it became cap. of Lithuania in 1323. At first it was predominantly Orthodox and Russian (Belorussian), but from the 17th cent. it became Catholic and Polish. It was the main seat of Jewish culture in Europe in the 17th-19th cents. It became Russian in 1795, and was the residence of the Governor-General of the Lithuanian and Belorussian provs.; it was a centre of the Polish national movement in the 19th cent., and of Social Democracy from the 1890s. V. was occupied by the Germans from 1915 to 1918 and 1941 to 1944; it was constitutional cap. of independent Lithuania from 1918, but in fact Polish from 1920 to 1939. Occupied by the Soviet Army in 1939, it was returned to Lithuania, but annexed by the U.S.S.R. with the rest of Lithuania in 1940. V. was cap. of V. Oblast 1950-3 (abolished). Pop. (1956) 200,000 (c. 1914, 193,000; 1921, 123,000; 1941, 235,000), before the War mainly Polish and Jewish, now Lithuanian and Russian.

Vil'nyus, see VILNIUS.

Vilvoorde (Fr. Vilvorde), tn in the prov. of Brabant, Belgium, 6 m. NNE. of Brussels. There are mills, breweries, and manufs. of lace, bristles, food-stuffs, chemicals, hardware, varnish, glue, and starch. Pop. 29,300.

Vimiro, vil. of Portugal, in Lisboa dist., 32 m. NNW. of Lisbon (q.v.). Here Wellington decisively defeated the French under Junot on 21 Aug. 1808, during the Peninsular War (q.v.). Pop. 600.

Vimy Ridge, upland in the dept of Pas-de-Calais, France, 5 m. NE. of Arras. The Germans captured V. R. in the early part of the First World War and held it against Fr. attacks in 1915. Canadian forces stormed the ridge on 9-10 April 1917, and 11,295 missing are commemorated by a memorial unveiled in 1936.

Vina del Mar, residential suburb of Valparaíso (q.v.), 5½ m. from the port, with which it is connected by rail along the shore. Pop. 85,000.

Vinan, see BINAN.

Vinca, see FERIWINKLE.

Vincennes: 1. Fr. tn in the dept of Seine, an E. suburb of Paris. The immense castle was a royal residence and fortress in the Middle Ages. It was later a state prison, and was turned into a military barracks by Napoleon. Here the Duc d'Enghien (q.v.) was shot in 1804. The surrounding woods of V. are popular as a resort; the Fr. Colonial Exhibition was held here in 1931. Chemicals and machinery are manuf. Pop. 50,400. See also SEVRES (porcelain).

2. City, seat of Knox co., Indiana, U.S.A., on the Wabash R. 50 m. N. of Evansville in agric., coal, and oil area. It cans and processes foods, and manufs. structural steel, farm implements, glass, flour, and furniture. One of the oldest settlements in Indiana, it is the site of a Fr. fort, taken in 1763 by the British and

renamed Fort Sackville. Captured by Clark for the Americans during the Amer. Revolution, it was ceded to the U.S.A. in 1783. It was cap. of the ter. of Indiana, and preserves the old capitol and the 200-year-old St Francis Xavier cathedral. Pop. 18,800.

Vincent, Edgar, see D'ABERNON.

Vincent de Paul, St (1576-1660), Fr. priest and philanthropist, b. Pouy. He was ordained priest in 1600, and on a journey to Marseilles in 1604 he was taken prisoner by Turkish pirates but eventually escaped. He became curé of Cllichy, and then tutor to the children of the Gondi family. He soon devoted himself, under the guidance of Béruille, to the relief of the poor, establishing what he called 'confréries de charité' in various tns in France. In 1625 he founded the Congregation of Mission Priests to train preachers who were to act as assistants to the regular clergy; and in 1632 the Sisters of Charity, who are devoted to the care of the sick. He was canonised in 1737; his feast is on 19 July. See T. Maynard, *Apostle of Charity*, 1940.

Vincent Ferrer, St (c. 1350-1418), b. Valencia. He became a Dominican, and adviser to the King of Aragon and the Avignon Pope. The ending of the papal schism was due in large part to his efforts. His feast is on 5 April.

Vincent of Beauvais (c. 1190-c. 1264), Dominican friar, who has been regarded as the precursor of the encyclopaedists. He compiled a summary of general knowledge under the title of *Speculum Majus*.

Vincent the Deacon, St (d. 304), martyred under Diocletian. He was a native of Huesca, and was educ. by Valerius, Bishop of Saragossa, who ordained him deacon. For professing his faith he was taken to Valencia and put to death. His festival is celebrated on 22 Jan.

Vincenzo di Biagio, see CATENA.

Vinci, Leonardo da, see LEONARDO.

Vinci, It. vil. in Tuscany (q.v.), 15 m. WNW. of Florence (q.v.). It was the bp. of Leonardo da V. (q.v.), and has a Leonardo museum in its 11th-cent. castle. Pop. 2000.

Vindhya Mountains, series of mt ranges in Central India, connecting at the extremities with the E. and W. Ghats.

Vindhya Pradesh, former state of Central India. It was formed in April 1948 of 35 states known as Bundelkhand and Baghelkhand States (including Rewa). Local rivalries, and economic and political backwardness, however, necessitated its conversion on 1 Jan. 1950 into a Chief Commissioner's Province. Ten of the states were merged into Uttar Pradesh and in 1956 the state was merged into Madhya Pradesh.

'Vindictive,' Brit. cruiser, took a leading part in the naval raid on Zeebrugge (q.v.) April 1918, and was then used in the raid on Ostend (q.v.). The V. was sunk, partially closing the harbour.

Vindobona, see VIENNA.

Vine, climbing shrubs of the genus *Vitis* and of the plant family Vitaceae. V. *vinifera* is the common grape V. and other species of grape V. include V. *acestivalis*,

V. Labrusca, *V. rotundifolia*, etc., but *V. vinifera* is the best known and longest cultivated. The plant is a native of Asia, cultivated from a remote period for its fruit, which, besides being one of the choicest dessert fruits (dessert varieties include Hamburg, Muscat, Gros Maroc, Gros Colmar, Muscadine, Sweetwater, Alicante, etc.), is made into wine and other fermented drinks, while the dried fruits of certain varieties (Malaga, Sultan, Alexandria, and Gordo Blanco) furnish raisins and currants. The *V.* was formerly much planted against sunny sheltered walls in the S. of England, but its production of fair-sized fruit is irregular. In a greenhouse its culture is easy: the roots are generally set in a border outside, the stem passing under arches or through holes into the house, where the shoots are trained up the roof. By control of the temp. and management of ventilation, fruit can be ripened, according to variety, over many months. The most famous wine grapes are the black Cabernet Sauvignon of Bordeaux, the black and white Pinot of Burgundy and Champagne, the Syrah of Hermitage, the Riesling of the Rhine and Moselle, the Pedro Ximenez of Jerez, and the Furrmint of Tokay. The *V.* is liable to the attack of many pests: mildew (q.v.), *cochylis*, *oidium* (q.v.), and worst of all the aphid *phylloxera* (q.v.), which attacks its roots and, invading Europe from America, laid waste European vineyards, 1858-63. *Phylloxera* was brought over with native Amer. *V.*s which are immune from its attacks and produce wine in quantity without quality, and all good wine to-day is made from native European *V.*s grafted on Amer. stocks. See A. F. Barron, *Vine and Vine Culture*, 1900; F. Malvezin, *Bordeaux*, 1919; A. J. Perold, *A Treatise on Viticulture*, 1927.

Vinegar, weak solution of acetic acid containing colouring matter, is obtained by the acetic fermentation of wine, beer, or other dilute alcoholic liquids. In wine-growing countries it is produced from wine; elsewhere malt *V.* is prepared from beer.

Vinegar Hill, hill (398 ft) in Ireland, overlooking Enniscorthy (q.v.), Co. Wexford. Here, on 21 June 1798 Gen. Lake defeated the main body of the Wexford rebels (see IRELAND, *History*; UNITED IRISHMEN).

Vingt-et-Un, or **Pontoon**, old card game, the object in which is to make out of the cards one holds 'twenty-one.' One card is dealt, face downwards, to each player, including the dealer or banker. Maximum and minimum stakes are arranged beforehand. The players look at their cards and stake accordingly. The game proceeds thereafter by a second deal and by the exercise of the option to draw further cards so as by a certain combination to make the desired total. An ace counts as 11 or 1, court cards 10, and the other cards according to 'pips.' The combination of an ace with a court card or other tenth card is called a 'natural.'

The dealer, after the first round is dealt, has the right to double the stakes.

The second round is then dealt. Those holding 'naturals' get 3 times their stakes from the banker. The dealer must then offer fresh cards in rotation, beginning with the player on his left. If a player wishes he can buy cards, and have them dealt face downwards to him, or have them 'twisted,' dealt face upwards. If he draws a card which brings his total over 21, he is said to have gone 'bust,' and hands his stake to the dealer. Those who have not overdrawn are said to 'stand' (whether their total is 21 or under), but the total must not as yet be revealed. The dealer's turn comes last. If he overdraws, he has to pay all round, except to those who have already handed in their stakes, by reason of overdrawing. The player with exactly 21 gets double his stake. If the dealer wins, he gets double his stake from each of the others remaining in the game. There is a variation of this game called *Fr. vingt-et-un*.

Vinland, or **Wineland**, country of uncertain identity discovered by Leif Ericsson (q.v.) in AD 1000, and so called from the wild grapes he found growing there. This and other recorded characteristics of *V.* have led scholars to place it somewhere on the E. coast of N. America, most probably in the neighbourhood of Mt Hope bay.

Vinnitsa (Ukrainian *Vynnytsya*): 1. Oblast in the Ukraine, lying in the Volhynia-Podolia upland, bordering on Bessarabia, in wooded steppe country traversed by the S. Bug riv. Sugar beet and wheat are grown, cattle are bred, and there are food industries. *V.* belonged to Volhynia, was Lithuanian by 1393, became Polish in 1569, and Russian in 1793. Area 10,600 sq. m.; pop. (1956) 2,143,000, Ukrainians (before the Second World War also some Jews).

2. Cap., economic and cultural centre of the above, on the S. Bug, 120 m. SW. of Kiev. It has varied industries. *V.* has been known since the 14th cent., was the residence of the Ukrainian Directory in 1918, and became prov. cap. in 1920. Pop. (1956) 105,000 (c. 1914, 48,000; 1939, 93,000).

Vinogradoff, Sir Paul Gavrilovich (1854-1925), Russo-Brit. jurist, b. Kostroma, N.E. of Moscow, became prof. of hist. at Moscow Univ. Resigning because of conflicts with the authorities in 1902, he took up residence in England. From 1903 he was prof. of jurisprudence at Oxford, and was knighted in 1917. His best-known pub. is *Village in England*, 1892.

Vintners' Company, one of the 12 greater livery companies of the city of London, originally known as the Merchant Wine Tunnors of Gascony, importing wine from Gascony. The Iter Rolls of the 13th cent. give evidence of its existence, but the earliest written reference to 'the mystery of Vintners' occurs in 1321. Letters patent were granted in 1363, and the company's first charter in 1437. The company's court room dates from the middle of the 15th cent., and its hall from 1671. To-day the company's charitable works are covered by a scheme called 'Vintners' Gifts,' while it still maintains

the closest contact with its trade, particularly from an educational angle.

Viol (It. *viola*), generic name for the chief family of bowed stringed instruments preceding that of the violin, of the 15th to the 17th cents. The V. was made in 4 sizes, and had from 5-7 strings, tuned in thirds and fourths: (i) the treble or descant; (ii) alto, tenor, or viola da braccio; (iii) bass, viola da gamba (corresponding respectively to the modern violin, viola, and violoncello); and (iv) the bass viol.

Viola, family Violaceae, genus of over 400 perennial herbs, found in N. and S. temperate regions. Botanically divided into sections and sub-sections, based largely on the form of the style. The more important groups are: (1) the true Violets—*V. odorata* or sweet V.; *V. cantina*, Dog Violet; *V. hirta*; *V. pedata*, Bird's-foot Violet; *V. riviniana*, Wood Violet; and (2) the true Pansies or Melanium—*V. altaica*; *V. arvensis*, Field Pansy; *V. calcarata*; *V. cornuta*, a parent of tufted Pansies; *V. lutea*, Brit. wild Pansy; *V. tricolor*, Wild Pansy; and parent of Garden Pansies.

Viola, see VIOLIN FAMILY.

Viola di Bordone, see BARYTON.

Viollet, see VIOLA.

Violin Family (including Viola, Violoncello, and Double Bass), stringed musical instruments played with the bow.

Violin. The violin consists of a resonant wooden box called the body; the neck, a solid piece of wood to which is attached the fingerboard; and the strings, fastened at one end to the lower part of the body by means of a projecting tail-piece, and at the other to pegs in the head, the scroll-like termination of the neck. The body consists of 2 thin, arched pieces of wood joined by side-pieces, or ribs to form a shallow box. The top surface, or belly, is made of a soft wood, pine or fir. The under surface, or back, is generally of maple or sycamore, as are the ribs. The body is so constructed that there are 2 deep inward curves in its sides, to make room for the bow when it is held steeply to play on the outer strings. The neck also is of maple, glued and mortised to a block fixed in the upper part of the body. The tail-piece and finger-board are of ebony, this hard wood being specially necessary in the latter case to prevent the finger-board from being worn into hollows by the player's fingers. Sound-holes are cut in the belly in the form of an *f* on either side of the bridge. The bridge itself is of maple, cut in a peculiar shape, which has remained practically unaltered since its introduction by Stradivari. Under the right foot of the bridge (or rather a little way behind it) is the sound-post, a small rounded bar of soft pine, joining the back and belly of the instrument, and serving the double purpose of supporting the pressure of the strings and communicating the vibrations to the back. Without the sound-post the tone would be very weak and of a poor quality. The bass-bar is a strip of wood glued to the inside of the V., and passing under the left foot of the bridge. The

strings are of catgut (the E string is often of steel wire), and are tuned in fifths, the highest, or first string, sounding the E on the fourth space of the treble clef, the other three descending to A, D, and G below. Since the time of the early It. masters there has been scarcely any alteration in the shape of the V. and modern makers are still following the model of Stradivari, and endeavour, unsuccessfully, to reproduce his exquisite tone.

The *Viola* is slightly larger than the violin, and more than proportionately thicker. It is tuned in fifths and a fifth below the violin. Music for this instrument is generally written in the alto clef (C clef on the third line). Its tone is somewhat grave and melancholy, and it has an attractiveness quite different from the charm of the violin.

The *Violoncello* is much larger than either violin or viola, and is held between the player's knees. Like the others, it has 4 gut strings, but in this case the 2 lower strings are generally spun over with silver wire. The signature is the bass, tenor, and treble clefs, and it is tuned in fifths, an octave below the viola.

The *Double Bass* is largest of all, having a deep, rougher tone. It differs somewhat from the other stringed instruments chiefly in having sloping shoulders, and in being differently tuned. Formerly double basses had only 3 strings tuned in fifths (A, D, G, on the bass staff), but a fourth string is now always added, sounding the E below the staff, and the strings are tuned in fourths (E, A, D, G). The actual sound is an octave below the notes written in the bass clef.

The *mute* is a contrivance for fixing on the bridge of all stringed instruments to deaden the sound. It produces a muffled note, which, when properly used, is very effective.

The V. is said to be derived from the Asiatic *ravanastrom*. This reached Europe as the Persian or Arabian *rebab* (Fr. *rebec*) from which the *viol* (q.v.) group derived.

The first maker of V.s who is known to have produced the instrument as we now have it was Gasparo da Salò, who worked about 1560. His V.s were large, very arched, and varnished dark brown. After him came the Brescian school of Maggini, Zanetto, Peregrino, Raphael, and others. Early in the 16th cent. Andrea Amati founded the Cremona school. He made some improvements, but accomplished less than did his sons, Antonio and Geronimo. The most famous member of this family was Niccolò (1596-1684), son of Geronimo who taught the still more famous Antonio Stradivari (q.v.) (1644-1737). The latter, as said above, has set the standard for succeeding generations. Among his pupils the foremost were Carlo Bergonzi and Giuseppe Guarneri. In the family of the latter there were many V. makers, the most successful being Giuseppe Antonio Guarneri (q.v.) (1683-1745). The work of Stainer, b. in the Tyrol in 1621, equalled that of the Amati. Of modern names the best known is Vuillaume, of Paris.

The latter city has also produced the most famous maker of V. bows, François Tourte (c. 1780).

See Forster and Sandys, *History of the Violin*, 1864; A. Bachmann, *An Encyclopaedia of the Violin*, trans. by F. H. Martens, ed. by A. E. Wier, 1925; E. van der Straeten, *The History of the Violin*, 1933; E. H. Allen, *Violin Making As It Was and Is*, 1946.

Viollet-le-Duc, Eugène Emmanuel (1814-79), Fr. architect and writer, b. Paris. After training in France and studying abroad, he began in 1840 the restorations which made him famous. At the Sainte Chapelle, 1840, and Notre Dame, 1842, he was associated with Lassus; most of his later restorations, which have been criticised as being too drastic, were carried out by him alone. They include the Cité of Carcassonne; the *châteaux* of Pierrefonds and Coucy; the abbeys of Vézelay and St Denis; S. Ouen at Rouen and S. Sernin at Toulouse. He became prof. at the Ecole des Beaux Arts in 1863. His prodigious output of books included dictionaries of architecture (10 vols.) and furniture (6 vols.). See life by U. Saint-Paul, 1881. His letters have been ed. by his son, 1902.

Violoncello, or Cello, see VIOLIN FAMILY. Vionville, or Mars-la-Tour, Fr. vil. in the dept of Moselle, c. 12 m. W. of Metz, site of a battle during the Franco-Prussian War (q.v.).

Viper (*Viperidae*), family of poisonous snakes, most abundant in Africa and SW. Asia. True V.s (*Vipera*) have a characteristic flattened triangular head and relatively short, thick body. The common V. or adder (q.v.) (*Vipera berus*) is the only poisonous Brit. snake. Others of



VIPER

the genus are the horned V. (*V. cornuta*) and Russell's V. (*V. russellii*) of India, which causes many deaths. The horned V., a small sand-coloured species with short, horn-like projections above the eyes, is said to be the 'asp' of Cleopatra. The rattlesnakes (q.v.) are also members of this family.

Vipers, Pit, see RATTLESNAKES.

Viper's Bugloss, or *Echium vulgare*, Brit. plant (family Boraginaceae) with bristly stems and leaves, and spikes of flowers which are at first rose colour, later turning to blue.

Vipsanius, see AGRIPPA, MARCUS VIPSANIUS.

Virbius, Lat. god, identified with Hippolytus (q.v.).

Virchow, Rudolf Ludwig Karl (1821-1902), Ger. pathologist, b. Schivelbein, Pomerania. He studied medicine at Berlin, qualified in 1843, and lectured there from 1846. In 1847 he founded the *Archiv für pathologische Anatomie* (Virchow's Archiv), one of the most important journals in medicine and still being published. In 1848 he served on the commission investigating epidemic typhus in Silesia and produced a report criticising the gov. for permitting the conditions under which the sufferers lived. He was appointed prof. of pathology at Würzburg in 1849, but returned to Berlin in 1856 to a new chair of pathological anatomy and to direct the Pathological Institute, which had been specially built for him. The year 1858 saw the pub. of his *Cellular-pathologie*, one of the great books in medicine and one which caused a revolution in medical thinking (Eng. trans., 1860). V. was the outstanding physician of his generation and the creator of modern pathology, to which he contributed many discoveries. His life was one of intense activity; he lectured, wrote hundreds of papers, and was a member of the Reichstag from 1880 to 1893. He also made useful contributions to anthropology and archaeology. See lives by C. Posner, 1921, and E. H. Ackerknecht, 1953.

Vire, Fr. tn in the dept of Calvados. There are ruins of a 12th-cent. castle built by Henry I of England, and an anct clock tower (13th-16th cents.). The tn was very badly damaged during the battle of Normandy (1944). SW. of the tn is the picturesque valley Vaux-de-V., whence comes the theatrical term 'Vaudeville' (q.v.). V. is an important mkt tn and has some manufs. Pop. 3900.

Virgil, Polydore, see VERGIL.

Virgil, Virgilius, or Vergilius Maro, Publius (70-19 bc), Lat. poet, b. 15 Oct. near Mantua in Cisalpine Gaul. He was educ. at Cremona and Mediolanum (Milan), and he took the toga virilis at Cremona in 55. It is said that he subsequently studied at Neapolis (Naples) under Parthenius, a native of Bithynia, from whom he learned Greek. He was also instructed by Syron, an Epicurean, and probably at Rome. After completing his education, V. appears to have retired to his paternal farm. In the div. of land among the soldiers after the battle of Philippi (42) V. was deprived of his property, but it was afterwards restored by order of Octavian. V. probably became acquainted with Maecenas soon after writing his *Eclogues*, in which Maecenas is not mentioned. His most finished work, the *Georgics*, was undertaken at the suggestion of Maecenas (*Georg.*, iii, 41), and was completed after the battle of

Actium, 31 bc, while Octavian was in the E. V. probably commenced the *Aeneid* at about this time. When Augustus was returning from Samos, where he had spent the winter of 20, he met V. at Athens. The poet, it is said, had intended to make a tour of Greece, but he accompanied the emperor to Megara, and thence to Italy. His health, which had been long declining, was now completely broken; he d. soon after his arrival at Brundisium on 22 Sept., not having quite completed his fifty-first year, and was buried near the road between Naples and Puteoli. Besides the *Eclogues*, *Georgics*, and *Aeneid*, sev. shorter pieces are attributed to V., which may possibly have been the productions of his youth. Such are the *Culex*, *Ciris*, *Copa*, etc. Of all his works the *Georgics* is both the most finished and the most original. The *Aeneid* (q.v.) is the national epic of the Romans. V. was by far the greatest of all the Rom. epic poets.

The best complete edition of V.'s works is that of J. Conington (1883-98). There are numerous eds. of separate works and trans. of the same; see particularly M. Oakeley's version of the *Aeneid* in Everyman's Library, that of the *Georgics* by C. Day Lewis, 1940, and of the *Eclogues* by J. Dryden (with *Georgics* and *Aeneid*), 1697. See also T. Frank, *Virgil*, 1927; C. Bailey, *Religion in Virgil*, 1935; R. W. Crutwell, *Virgil's Mind at Work*, 1946.

Virgin Islands, The, group of 3 is., St Thomas, St Croix, and St John, together with about 50 smaller ones, all in the W. Indies, and belonging partly to the U.S.A., partly (i.e. Anegada, Virgin Gorda, Tortola, Jost Van Dykes, Peter Is., Salt Is., and all others not in the possession of the U.S.A.) to Britain. Sugar, cattle, cay oil, tobacco, vegetables, limes, and bay rum are the main products. The Amer. V. I. are under a governor, appointed by the president of the U.S.A., with the approval of the Senate; the legislative assembly is composed of the 2 municipalities. The Brit. V. I. form a presidency of the Leeward Is.

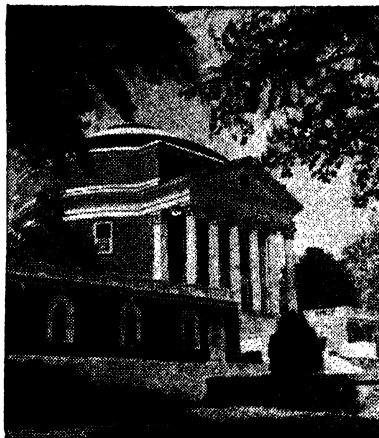
The V. I. were discovered by Columbus in 1493 and named after St Ursula. The English occupied Tortola in 1666 and have remained in occupation ever since. The Amer. V. I., St Croix, St Thomas, etc., were taken by the English from Denmark in 1801, restored in 1802, surrendered to the English in 1807, and again restored in 1815. In 1917 they were bought by the U.S.A. from Denmark. Area of the Amer. is., 132 sq. m.; pop. 24,900. Area of the Brit. is., 67 sq. m.; pop. 6505.

Virgin Land Campaign, measures for the cultivation of virgin lands and reclamation of waste land in the U.S.S.R., initiated by Khrushchëv (q.v.) in 1953, and aimed at ensuring an adequate supply of grain. It affects mainly W. Siberia, N. Kazakhstan, and S. Urals, and brings there new settlers from European Russia, chiefly semi-compulsorily recruited young people. By 1956 87,500,000 ac. had been cultivated.

Virgin Mary, see MARY THE BLESSED VIRGIN.

Virginal, see HARPSICORD; **PIANO-FORTE**.

Virginia, 'Old Dominion,' one of the 13 original states of the Amer. Union, bounded on the N. by W. Virginia and Maryland, on the E. by Chesapeake Bay, the Atlantic Ocean, and Maryland, on the S. by N. Carolina and Tennessee, on the W. by Kentucky and W. Virginia. It has an area of 40,815 sq. m., and is divided into: tidewater V., the low-lying region along the coast consisting of 4 peninsulas; the Piedmont, the central part rising to the Blue Ridge Mts; the Shenandoah Valley between those mts and the Alleghenies, a rich farming dist.; and SW. V., extending to the W. and including



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mts and fertile valleys. Two-thirds of the area of the state are given over to farming, with 16,000,000 ac. in farm and pasture land, of which 4,000,000 are in crops. Tobacco and apples are important crops; others are corn, winter wheat, cotton, and peanuts. Dairying, livestock (especially horses in the Piedmont), and turkey-raising are important. E. Virginia is an extensive truck-farming area. Among important industries are lumber and timber products, tobacco manufactures (Richmond is the world's largest cigarette centre), and flour and grist-mill products; the state also produces large quantities of leather and cotton goods, boots and shoes, chemicals, cars, foundry and machine-shop products, and iron and steel from blast furnaces. The chief mineral products are coal, stone, gravel, sand, and zinc, and others include titanium cement, feldspar, clay, lead-

gypsum, manganese, mica, pyrites, and salt. The 1500 m. of tidal shore on the Atlantic, Chesapeake Bay, and the entering rivers have important fisheries, especially of oysters. The chief ports are Norfolk and Newport News, on Hampton Roads, formed by the estuary of the James, on which river stand Richmond, the largest city and cap., and other important cities. There are 25,750 ac. of State Parks, as well as the Shenandoah National Park in the Blue Ridge Mts. V. is famous for its educational institutions, including the Univ. of V. (see VIRGINIA, UNIVERSITY OF), Washington and Lee Univ., William and Mary College, the Univ. of Richmond, V. Military Institute, and Hampton Normal School, the latter being the first school for Negro higher education established in the S. The first permanent Eng. settlement was made at Jamestown in 1607 under the leadership of John Smith. In 1624 the charter formerly possessed by V. was revoked and V. became a crown colony. During the Fr. and Indian War Virginians saved Braddock's army from annihilation. V. took a leading part in the Revolution, and seceded with the S. States in 1861. The W. part of the state, which was against secession, broke away during the Civil war and became the state of W. Virginia. V. has been called the 'Mother of Presidents.' Five were not only from V., but were residents there when elected, George Washington, Thomas Jefferson, James Madison, James Monroe, and John Tyler. Three others were b. in V., but were residents of other states: W. H. Harrison, Zachary Taylor, and Woodrow Wilson. Leading cities are: Richmond, 230,310; Norfolk, 213,513; Roanoke, 91,921; Portsmouth, 80,039; Lynchburg, 47,727; Newport News, 42,458; Petersburg, 35,054. Pop. of the state is 3,318,680.

See W. Stith, *History of the First Discovery and Settlement of Virginia*, 1865; T. J. Wertenbaker, *Virginia under the Stuarts (1607-83)*, 1914; H. J. Eckenrode, *The Revolution in Virginia*, 1916; R. A. Lancaster, *Historic Virginian Homes and Churches*, 1915; P. A. Bruce, L. G. Tyler, and R. L. Morton, *History of Virginia* (3 vols.), 1924; M. P. Andrews, *Virginia: the Old Dominion*, 1937.

Virginia, University of, most celebrated institution of learning in the S. of the U.S.A., opened in 1825 in Charlottesville, Virginia. Jefferson drew the architectural plans for the main semi-Gk buildings, the beautiful campus, and the old serpentine brick walls. He also drew up the plans for the very liberal curriculum and invented the honour system, whereby the students were not under supervision when writing their examination papers. Two other presidents of the U.S.A. were also connected with the Univ., James Madison and James Monroe. The State grants the Univ. an ann. sum and it now has endowments of over \$14m. In addition to the College of Arts and Sciences there are the following schools: Graduate Studies, Business Administration, Education, Engineering, Medicine. Library collections total 725,000 accessible

books, 350,000 unbound documents, etc., and 3,700,000 MSS.

Virginia, West, see WEST VIRGINIA.

Virginia City, city and co. seat of Storey co., Nevada, U.S.A., settled in 1859 after the famous Comstock Lode was discovered (1857). The mines under the city produce large quantities of gold and silver bullion. V. is also a tourist centre and dairying area. Pop. 950.

Virginia Creeper, see PARTHENOCISSUS.

Virginia Water, dist. of Egham, Surrey, England. The lake, 1½ m. long, lies in the S. of Windsor Great Park, and was formed by the Duke of Cumberland, the victor of Culloden.

Virgo, or the Virgin, sixth sign of the zodiac (q.v.), and an ancient constellation, noted for its nebulae, situated in the head and breast, of which the spiral Messier 99 is the chief. The sign of this constellation is entered by the sun about 21 Aug. It was usually represented by a woman holding an ear of corn, Spica, and was identified in Egypt, probably from Chaldea, with the goddess Ishtar. It marked the Egyptian harvest time. It is also associated with Astraea, Demeter, and Persephone. There are 30 stars of magnitude 4.4-5.2.

Virgula Divina, see DIVINING ROD.

Viroconium, see WROXETER.

Virtanen, Arturi Ilmari (1895-), Finnish biochemist, b. Helsinki and educ. at a school in Viipuri and at the univs. of Helsinki, Zürich, Münster, and Stockholm. He taught organic chemistry at Helsinki from 1924, and in 1939 became prof. of biochemistry at the Univ. there. In 1945 V. was awarded the Nobel Prize for chemistry. V. did extensive research on the effects of micro-organisms on the quality of food.

Virtual Displacement and Virtual Work. If a point at O be conceived as displaced to D, OD is called the *virtual displacement* of the point. The product of a force and the projection along its direction of the virtual displacement of its point of application is the *virtual work* of the force. The principle of V. W. has many useful applications in problems in statics, one example of which is as follows: If a free particle is acted on by any number of forces in the same plane, it will be in equilibrium if, for every arbitrary displacement, the virtual work of the system of forces vanishes. Problems can frequently be simplified by choosing a displacement in a direction at right angles to one of the forces; thereby ensuring that this force will not appear in the equation of virtual work.

Viruses. Causative agents of many diseases in plants (e.g. tobacco mosaic, potato leaf-roll), in animals (e.g. foot-and-mouth disease, distemper, rabies), and in man (e.g. measles, influenza, smallpox, yellow fever, poliomyelitis). Most V. are too small to be seen under the ordinary microscope, though they can be studied by electron microscopy; the largest, such as that of psittacosis (q.v.), measure about 250 mμ (1 mμ = 1/1,000,000 mm.) and are little smaller than some bacteria, whilst the smallest include such as poliomyelitis

10 μ), which is comparable in size with large protein molecules. Since they are able to pass through the pores of earthenware filters, the term filterable V. is often applied to them. The V. of animals appear to be living micro-organisms, but some of the plant V. have been obtained as crystalline proteins (e.g. tobacco mosaic V. in 1935 by Stanley), and must therefore be regarded as self-propagating enzymes. The discovery of V. dates from 1892, when Ivanowski showed that filtered sap of tobacco plants could transmit mosaic disease; in 1898 Loeffler and Frosch demonstrated the virus nature of foot-and-mouth disease, and they were followed by Reed in 1901 for yellow fever. Infection by V. takes place through the skin, as in warts, or through the mucous membranes, as in droplet infections of the respiratory tract, such as influenza; insect vectors are often important, for instance aphids in plant V. and mosquitos in Yellow Fever. One attack of a virus disease in mammals often conveys subsequent immunity (see SMALLPOX), though recurrent attacks of influenza (q.v.) and the common cold are frequent. The majority of virus diseases in human beings do not respond to treatment with the antibiotics or sulphonamides. Exceptions to this rule are primary atypical pneumonia, psittacosis, lymphogranuloma venereum, and herpes zoster. These 4 respond to aureomycin. See K. M. Smith, *The Virus*, 1948; Macfarlane Burnet, *The Natural History of Infectious Disease*, 1953.

Vis (It. Lissa), Yugoslavian is. in the Adriatic, the outermost is. of the Dalmatian archipelago. Its cap. is also called V. (pop. 2800). In 1811 a Fr.-Venetian naval force was defeated near the is. by the British, and in 1866 the Austrians were victorious over the Italians; this latter engagement was the first between iron-clad, steam-driven warships. During the Second World War the is. was for a time the H.Q. of Marshal Tito's (q.v.) partisans, and it was also used by Brit. commandos. The chief products are wine and sardines.

Visby, seaport of Sweden, cap. of Gotland is., on the W. coast of the is. in the Baltic. St Mary's Cathedral was founded about 1190-1225, and is still used. W. was an important member of the Hanseatic League, and gave its name to a maritime legal code of the 13th cent. Its ruined turreted walls date from the 13th cent. It is a favourite holiday resort. Sugar, chalk, and cement are among its exports. It became Swedish in 1648. Pop. 15,202.

Visoacha (*Vizcacha viscacia*), a large, heavily built rodent related to the chinchillas, inhabiting the pampas of Argentina. The head and body measure about 2 ft. The V. is a nocturnal animal and lives in warrens ('viscacheras'). The general body colour is mottled grey and black. A stiff brush of bristles on the third digit of the hind foot is used as a fur-groomer.

Vischer, Peter (c. 1460-1529), Ger. sculptor, b. Nuremberg. In collaboration

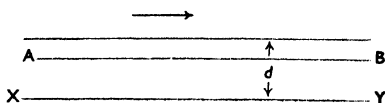
with his son Peter Vischer the younger (1487-1528), he executed a relief representing the coronation of the Blessed Virgin in Erfurt cathedral, a tomb of Archbishop Ernest in Magdeburg cathedral (1497), and the shrine of St Sebald at Nuremberg (1508-18), the latter being generally regarded as the sculptural masterpiece of the Ger. renaissance and abounding in details executed with amazing skill. See C. Headlam, *Peter Vischer*, 1901; A. Feulner, *Peter Vischers Sebaldusgrab*, 1924.

Visconti, name of a noble Lombard family which ruled Milan for nearly 2 cents. Their lordship was estab. by Ottone, who was appointed to the archbishopric of that tn in 1262. He drove out the opposing family of the Della Torre, and left his possessions to his nephew, Matteo. In the 14th cent. the V. were in constant conflict with the papacy. During this century the V. were supreme in Milan, and Galeazzo II was of such importance that he was able to marry his daughter and son respectively to a son of Edward III of England and the daughter of the Fr. king. He patronised the arts, refounded a univ. at Pavia, and was a patron of Petrarch. He was succeeded by the joint sovereigns Barnabo and Gian Galeazzo (d. 1403), the latter of whom was the most powerful of all the V. He was finally made Duke of Milan by the Emperor Wenceslaus (1395). His son, Filippo Maria, who succeeded him, and who was the last of the male V. line, d. in 1447, being succeeded by Francesco Sforza.

Visconti, Tebaldo, see GREGORY (popes) — Gregory X.

Viscose Silk, see RAYON.

Viscosity, property of a fluid whereby it resists the relative motion of its parts. Thus, for example, when tea is stirred by a spoon, it is the V. of the tea that brings it to rest again. Viscous forces are merely frictional forces of a special kind. The tea comes to rest under the action of liquid friction between the layers of tea that are moving relative to one another, and under the action of the liquid friction between the cup and the layer of tea next to it. Fluids like pitch, treacle, and heavy oils are highly viscous, but all fluids, and even gases, are viscous to some extent. The ideal 'perfect fluid' is non-viscous, but no real fluid is perfect. The special character of this fluid friction was guessed intuitively by Newton, who formulated the law of V. that has stood the test of experiment. Newton's law is best explained in the following way. Suppose a stream of liquid is moving from left to right (see diagram) over a horizontal bed XY.



The velocity of any layer parallel to the bed depends on its distance above the

bed; the layer next to the bed is at rest, while the surface layer is moving fastest. If we consider the layer AB we realise that the surface of the liquid immediately below it experiences a viscous force acting in the direction AB, tending to speed it up relative to the faster-moving layer above it. The latter simultaneously experiences an equal and opposite viscous force in the direction BA, that acts as a drag on it, tending to reduce its speed to that of the slower-moving layer below it. As a result of these viscous forces the relative motion of the various layers will vanish unless there is some external force acting on the liquid to maintain the relative motion. Newton's law enables us to compute the viscous forces acting in this liquid. Suppose the surface layer is moving with a velocity v parallel to the bed; the layer XY is at rest. There is therefore a velocity gradient, which is

given in the simplest case by $\frac{v}{d}$, where d is the depth of the liquid. The viscous force F per unit area of any layer parallel to the bed is $\eta \frac{v}{d}$, where η is a constant for a given fluid at a given temp., known as the coefficient of V . of the fluid. The direction of this force is parallel to the bed and $F = \eta \frac{v}{d}$, or $\eta = \frac{Fd}{v}$. When the

moving parts of a machine are lubricated by means of a layer of oil the friction between the parts of the machine is greatly reduced. If, for example, the space between a plate moving over a fixed bed is lubricated by a film of oil whose thickness is d , the frictional force between the plates will be $\eta \frac{v}{d}$ per unit area, where v is the velocity of the moving plate and η the coefficient of V . of the lubricating oil (see LUBRICANTS). Two examples serve to illustrate the V . of air. The vibrations of a pendulum are 'damped' by the air-friction on its surfaces, while the V . of air is sufficiently great to balance the weight of raindrops moving with a certain speed. Raindrops, therefore, on reaching this speed continue to descend with a uniform velocity. This is given by Stoke's Law, $mg = 6\pi\eta rv$ where mg is the weight of the drop of radius r and terminal velocity v , and η is the coefficient of V . for air. The kinetic theory of gases gives a satisfactory explanation of the V . of a gas. According to this theory, there is a continuous exchange of molecules between any 2 layers of a gas. Hence if one layer is moving relative to the other, it receives slower molecules from the other layer and loses faster molecules to it. The effect is the same as if a viscous force acted across the surface separating the 2 layers, tending to destroy their relative motion. See E. Hatachek, *The Viscosity of Liquids*, 1928; J. R. Caddell, *Fluid Flow in Practice*, 1957.

Viscount (from Low Lat. *vicecomes*, 'in place of earl,' through O.F. *viscomite*), in the U.K. the title of the fourth degree of nobility, between earl and baron, first granted in England to John Lord Beau-

mont in 1440. Originally the title was given to the deputy sheriff, who acted on behalf of an earl within his estate.

Viseu: 1. Dist. of N. central Portugal, mainly in Beira Alta prov., but partly also in Trás-os-Montes e Alto Douro and Douro Litoral provs. (qq.v.). It is bounded in the N. by the Douro (q.v.), and is generally mountainous. Much port wine is produced. Area 1932 sq. m.; pop. 487,200.

2. City of Portugal, cap. of V. dist. and of Beira Alta prov., 150 m. NNE. of Lisbon. It dates from Rom. times, and has a cathedral (partly 12th cent.) and an airfield. A chapel near by is said to contain the tomb of Roderic (q.v.), the last Visigothic king. There is an agric. mrkt, and there are textile manufs. Pop. 15,000.

Vish, see BIKH.

Vishinsky, see VYSHINSKIY.

Vishnu, occupies the second place in the Hindu Trimurti (q.v.) or Triad (q.v.). He embodies the preserving principle, and his worship is of very ant. date, and to-day he is often worshipped as the superior of Brahma. V. has undergone a number of Avatars or Incarnations, the number given being various. His 2 most famous incarnations are those as Rama and as Krishna. Under the latter form he is the hero of the great poem, the *Mahābhārata*.

Visibility, term used in meteorology and aviation to describe the transparency of the atmosphere. It is the horizontal distance to the farthest object that can be recognised. V . may vary with direction, and for landing aircraft, an important distinction must be made between the horizontal V ., as estimated by the meteorologist, and the slant V . which affects the pilot's ability to recognise the runway. At night estimates can be made by noting the number of runway lights visible from a fixed point, or with the aid of the instrument known as the Gold V . meter, used in conjunction with a fixed light of known strength.

In looking at a black object at a distance, the light from the sun (either direct, diffused through clouds, or reflected from the ground) is scattered by air molecules and other small particles between the observer and the object so that the object does not appear completely black. This apparent brightness depends on the amount of scattering between the observer and the object, which therefore appears less bright than the background, for there must be more scattering in the greater distance between the observer and the background. At the V . distance this difference can just be distinguished; at greater distances it cannot. V . is therefore a rough but practical measure of the number of scattering particles or impurities in the atmosphere, for most scattering is produced by particles consisting of solutions of hygroscopic nuclei, which are absorbed into the atmosphere mainly from smoke. Mist and rain drops by diffuse reflection and refraction have a similar effect to scattering but more pronounced; when the water droplets are very numerous the V . is very low, being

defined as mist when below 2 km. (2200 yds) and as fog when below 1 km. (1100 yds). Fog and mist are most likely when the air is at its dampest, i.e. when coldest just about sunrise (see further under Fog). In relatively dry air the worst V. is probably experienced in and near tns at about 8 a.m., when most domestic fires are being lit and when the air is at its most stable and quietest so that the pollution is not carried away. The best V. occurs in clean arctic or polar air or in high mt regions.

Visigoths, see GOTHES.

Vision. Sensory nerve fibres are very fine cylindrical threads, ending outwardly in the sensitive surfaces and sense organs, and inwardly in the nerve centres, especially the brain. Impressions on their outer extremity are transmitted along the fibre with a velocity of about 100 ft a second and determine changes in the nerve centres, which in turn may determine changes in consciousness or sensation (q.v.). The optic nerves are organised to respond to the ethereal vibrations called light (q.v.) and nothing else. If, therefore, these nerves be mechanically irritated, nothing is felt, but a flash of light is seen. All the higher senses may be regarded as the result of refinements of common sensation, each a more refined touch. In sight, objects are perceived at a distance which is illimitable, the vibrations being conveyed by a medium which is universal and too subtle to be recognised except as the bearer of light. The direct data of V. or sight, and what are added by the mind as judgments based on such data must be distinguished. The direct data are only light, its intensity and colour, and direction. These, being incapable of further analysis, are simple sensations. But size and distance and solid form, though they may seem to be perceived, are not direct perceptions, but only very simple judgments based on these data (for the general structure of the eye see under EYE).

Formation of Images. The eyeball may be regarded as consisting of 2 distinct portions: a nervous expansion, the *retina*, which responds to light-vibrations, and an optical instrument, the *lens apparatus*, placed in front of the retina, and arranged to make the impression of light strong and definite by means of an image. These 2 portions entirely differ in their embryological origin, but they meet and unite to form the eyeball, the sole object of which is the formation of a perfect image on the retina. Without images, light could be perceived, but not objects, and the distinctiveness of objects is exactly proportioned to the distinctiveness of retinal images. Hence a serviceable image must be sufficiently bright and perfectly sharp and distinct in outline, and in order to be perfectly distinct it is necessary that rays from different points in the object, even the most contiguous, should not mingle on the image, but that all the rays from each point on the object should be carried to its own point on the image, conditions which can be fulfilled only by the arrangement found in the eye.

Colour Vision. The sense by which the eye distinguishes and recognises colours. According to the Young-Helmholtz *Trichromatic* theory of colour V. there are 3 kinds of sensory cones in the retina. When excited they produce the sensation of red, green, and violet respectively. A sensation of white is produced when the 3 types of cones are excited to the same extent, while other colour sensations are produced by the excitation of the 3 kinds of cones to different extents. In addition, there are sev. modifications of the Trichromatic theory by V. Krels, McDougall, and Roaf.

In opposition are a group of theories known as the Tetrachromatic Theories based on Newton's discoveries, supporters of which are Hering, Lodd-Franklin, Müller, and Edridge-Green.

Colour Blindness. See COLOUR-BLINDNESS.

Vision and Colour Sense in Animals. The structure and functioning of the eye in other mammals, and indeed in all vertebrates, resembles in general that of man, though reptiles, amphibians, and fishes accommodate for objects at varying distances by a backward and forward movement of the lens instead of by a change in its shape. Amongst invertebrates a true eye capable of forming images is confined to the molluscs, such as the cuttlefish (which has a pair of eyes of curiously human aspect), and the arthropods (insects, crustaceans, etc.). Many other invertebrates, as for instance the common earthworm and even some unicellular organisms, are sensitive to the difference between light and darkness.

The extent to which animals apart from man are able to distinguish various colours is still under investigation. Much early work is of little value, owing to the failure to differentiate between colour and brightness: an animal may be sensitive to a certain colour simply because that colour is brighter than the surroundings. Colour vision certainly occurs in birds, bony fish, some reptiles, and in primates. The majority of mammals (including, for example, dogs and cats but excluding primates) are probably colour blind, despite the popular belief that red is a distinctive colour to bulls. Amongst insects the work of von Frisch has shown that the honey bee can distinguish blue and yellow, but not green or red, so that it resembles in its colour sense the commonest type of colour-blind human individual.

Erect Vision. Retinal images are all inverted. External images or signs of objects are outward projections of retinal images. Yet they are not seen inverted owing to the 'law of visible direction,' which may be thus stated: 'When the rays from any radiant strike the retina, the impression is referred back along the ray-line into space and therefore to its proper place.'

Single and Double Images. The preceding paragraphs proceed on the assumption that V. is monocular. The phenomena of binocular V. are less purely physical than those of monocular V.

There being 2 retinæ, there are 2 retinal images of every external object, and since retinal images are projected outward into space as external images, there must be 2 external images of every object. In fact, all objects are seen double, except under certain special conditions. This can be proved by simple experiment, e.g. point with the forefinger at some distant object, looking with both eyes at the object, not the finger. Two fingers will be seen, one of them pointing at the object and the other far out of range, usually to the right. It is evident that any object looked at directly is seen single, but that all things nearer or beyond the point of sight are seen double. But an object is seen single when the 2 images of it are projected outward to the same spot in space, and are therefore superimposed and coincide. Under all other than these special conditions objects are seen double. The 2 external images of an object are thrown to the same spot and thus superimposed and seen single when the 2 retinal images of that object fall on what are called corresponding points or identical points of the 2 retinæ; if they do not fall on corresponding points of the 2 retinæ, then the external images are thrown to different places in space, and therefore seen double. All the phenomena of binocular V. are explained by the 'law of corresponding points,' for which see any text-book.

Horopter. If any point is looked at, the 2 visual lines converge and meet at that point. Its 2 images therefore fall on corresponding points of the 2 retinæ, viz. on their central spots. A small object at this point of convergence is seen absolutely single. All objects beyond this, the point of sight, are seen double (in the one case homonymously, in the other heteronymously) because their images do not fall on corresponding points of the 2 retinæ. But objects below or above or to one side or the other of the 'point of sight' may possibly be seen single also. The sum of all the points which are seen single while the point of sight remains unchanged is called the horopter. The nature and form of the horopter have given rise to much controversy.

See also **BLIND SPOT**.

See W. D. Wright, *Researches in Normal and Defective Colour Vision*, 1946; J. H. Prince, *Visual Development*, 1949; H. H. Emsley, *Visual Optics* (5th ed.), 1952, 1953.

Vision, Defects of. These may be due to affections of the nervous mechanism of the eye, to inflammatory and other changes in the transparent media through which light passes, or to errors of accommodation or co-ordination. The optical mechanism of the eye and the D. of V. arising from defective refraction are discussed in the articles on **EYE** and **REFRACTION, ERRORS OF**. Pathological causes that produce defective vision are so numerous as to require the attention of specialists in medical practice. Tumours in the brain may cause impairment of function of part or the whole of the visual

centre. Thus a lesion may cause hemianopia or half-blindness, one side of the visual field in each eye being affected. Toxic influences, such as that of tobacco, are usually responsible for Amblyopia (q.v.), in which the visual impressions are dimmed. Paralysis or inflammation of the optic nerve may cause total or partial blindness. Glaucoma (q.v.) is a condition caused by a rise of pressure inside the eyeball; various visual defects are experienced, which may proceed quickly or gradually to total blindness. Glaucoma may be chronic or acute. Keratitis, or inflammation of the cornea, is the result of injury or is secondary to conjunctivitis. Opacity of the lens is known as cataract (q.v.); it may be due to injury, to degeneration of the tissues in old people, or to altered nutrition. Iritis (q.v.) is a painful and dangerous condition dependent on a variety of causes, such as injury, constitutional disturbances of various kinds, extension of inflammation from other structures, etc. Conjunctivitis (see **CONJUNCTIVA AND CONJUNCTIVITIS**) may be catarrhal or purulent; most varieties are contagious, hence the necessity for care in dealing with discharges from a diseased eye. When the 2 eyes are not co-ordinated, a condition of diplopia or double-vision exists; this is due to an affection of the oculomotor nerves. See also **BLIND, Blindness and Causes of Blindness; COLOUR-BLINDNESS; BLEPHARITIS; MYOPIA; PINK EYE; SQUINTING; TRACHOMA; VISION**.

For the treatment of wounds and foreign bodies in the eye see **under EYE**; and for sight-testing, see **under REFRACTION, ERRORS OF**.

Visions, see **APOCALYPSE; APPARITION; SPIRITUALISM; REVELATION, BOOK OF; THEOSOPHY**.

Visit and Search, in international law the right inherent in all belligerents in time of war to stop private or mercantile vessels carrying the flag of a neutral state, and being within the territorial waters (see **TERRITORIAL WATERS**) of the belligerent or his enemy, in order to ascertain whether such vessels are in fact neutral. Warships are not the subjects of this right. The right is exercised by sending an officer on board the suspected vessel to examine the register (see **MERCHANT SHIPPING ACTS**), the log, invoices, and charter-party and other ship's papers, so as to satisfy himself that both the character of the ship and the nature of her cargo are neutral. From the Parliamentary Papers relative to the Declaration of London (q.v.) it seems that the Brit. point of view yielded to the Continental doctrine that the 'neutral vessels under national convoy are exempt from search.' Resistance to V. and S. justifies capture. If V. and S. are impracticable at sea, in view of the conditions of modern warfare, a vessel may be taken into harbour for the purpose.

In the Second World War, after July 1940, all neutral ships proceeding to European shores had to possess a navicert (q.v.), or otherwise both ship and cargo were liable to seizure by the R.N.

See Parliamentary Papers Misc. No. 6 of 1915 and No. 15 of 1916. *See also* Hall, *International Law*, 1924; Birkenhead, *International Law*, 1927. *See also* BLOCK-
ADE; CONTRABAND.

Visitation, Order of the, *see* FRANCIS OF SALES, ST.

Visitation of the Blessed Virgin Mary, Feast of the, festival on 2 July commemorating the sanctification of St John the Baptist in the womb of his mother, St Elizabeth, by the visit of the Blessed Virgin who was then bearing her own Son. The feast was instituted for universal observance in 1389 by Urban VI as a supplication for the end of the Great Schism.

Visitor, officer or superior whose duty it is to visit a corporation, civil or eccles., in order to see that its rules and regulations are being observed, and that there is no serious default. The visitation of civil corporations is the work of the Crown, which acts through the medium of the court of Queen's Bench. The bishop is the V. of his diocese; but, on account of the number of par., the visitation is usually left to the archdeacons.

Viso, Monte (height 12,605 ft), highest peak of the Cottian Alps (q.v.), situated in Italy near the F. border. It was first climbed, 1861, by Wm Matthews (1828-1901). The R. Po rises on its N. slopes. Its comparatively isolated position renders it a notable object in any Alpine summit view and as seen from the plain of Piedmont.

Vistula (Ger. Weichsel; Polish Wisła), chief riv. of Poland, which rises in the Beskid Mts (*see* CARPATHIANS), SSE. of Cieszyn, and flows NE, then NW. and N. past Crakow, Warsaw, Plock, and Toruń, to the Baltic Sea at the Gulf of Danzig. It enters the sea by sev. arms, of which the main arm, the 'Dead V.' (Polish *Martwa Wisła*), passes Gdańsk (q.v.) and Nowy Port. The E. branch is called the Nogat R. It is connected by canal with the Oder, the Neman, and the Bug (q.v.). Its main tribs. are: on the right, the Skawa, Dunajec, Wisłoka, San, Narew, and Drweca R.; and on the left, the Nida, Pilica, Brda, and Wierzyca Rs. Length 670 m. *See* FRISCHES HAFF; and *see* EASTERN FRONT OF RUSSO-GERMAN CAMPAIGNS IN SECOND WORLD WAR.

Vistula Lagoon, *see* FRISCHES HAFF.

Vital Statistics. The England and Wales birth-rate (per 1000 pop.) declined progressively from 25.5 in 1920 to 14.4 in 1933, after which it varied between 14 and 15 until 1941. The rate then rose steadily to the post-war peak of 20.6 in 1947. In the years 1948-51 there was a decline to 15.4, but since then there have been only small fluctuations—e.g. the rate in 1954 was 15.2. In 1954 most European countries had birth-rates between 14.6 and 23: the Dominion birth-rates were from 22.5 in Australia to 28.5 in Canada: the U.S.A. rate was 24.9, and that for Japan 20.0.

The lowest recorded death-rate per 1000 pop. of England and Wales was 10.8 in 1948; since then it has risen as high as

12.5 in 1951, but in 1952-54 the rate was steady at 11.3-11.4. This rate of 11.3 compares with the following 1954 rates for other countries: Netherlands 7.6, Norway 8.4, S. Africa 8.6, New Zealand 9.0, Australia and Denmark 9.1, U.S.A. and Italy 9.2, Sweden 9.6, Belgium 11.9, France 12.0, and Austria 12.1. The infant mortality rate (that is, the number of deaths of infants under one year of age per 1000 live births) for England and Wales in 1954 was 25. This compares with 1954 rates for other countries as follows: New Zealand 20, Australia 22, U.S.A. 27, Canada 32, S. Africa 34, France 42, Ceylon 72, and India 119.

Royal Commission on Population, 1944. This Commission was appointed to inquire into the facts concerning Brit. pop. trends, their causes and probable consequences; and to 'consider what measures, if any, should be taken in the national interest to influence the future trend of population.' Surveying the growth of Britain's pop. from about 7,000,000 in 1700 to 49,000,000 to-day, the report of the Commission (pub. in June 1949) concluded that reductions in the death-rate were the main influence making for expansion of numbers. The rate of increase had slackened because the birth-rate, starting to drop in the 1870s, came to fall faster than the death-rate. This fall in births was not due to any change in the proportion of people marrying but to a decline in the number of children b. per married couple. Holding any marked increase or decrease in Britain's pop. alike undesirable, the Commission urged a national effort to raise the average family size from 2.2 to 2.4 children, just sufficient to secure replacement.

DISTRIBUTION OF FAMILIES BY SIZE

Number of Children Born	Marriages Taking Place about 1860 (1911 Census of England and Wales)	Marriages of 1925 (Great Britain, 1946 Family Census)
	<i>Per cent</i>	<i>Per cent</i>
0	9	17
1	5	25
2	6	25
3	8	14
4	9	8
5	10	5
6	10	3
7	10	2
8	9	1
9	8	0.6
10	6	0.4
Over 10	10	0.3

Such a change is not likely to come about of its own accord without deliberate encouragement. The increase in births since 1941 does not, on analysis, clearly point to an enlargement of family size. Most of the additional children born in

1941-7 seem to have been either 'arrears' from earlier years (births postponed owing to the outbreak of war) or 'borrowings' from the future (births brought forward for various war-time and immediate post-war reasons). The Commission also found that the early stages of the decline in family size went on fastest among the higher occupational categories. Among couples married between 1900 and 1930 the families of manual workers have consistently been about 40 per cent larger than those of non-manual workers, the average for the most recent groups being 2.5 children for the manual workers and as low as 1.7 for the non-manual group.

The table shows that the reduction of 60 per cent in the size of families between the mid-Victorian era and the period 1925-9 has been achieved by the substitution of 1- and 2-child families for families of 5, 6, or 7 children as the most common sizes of family and by the virtual disappearance of families of more than 6 children, which were formerly very numerous.

Disregarding the effects of emigration and immigration, the Commission predicted with confidence that: (i) total numbers would continue to grow slightly in the near future, perhaps for another generation; (ii) the pop. of working age would remain at about its present size for at least the next 30 years, though it would come to form a somewhat smaller proportion of the total; (iii) the pop. of young adults (15-39) would show a fall of about 1,400,000 in the next 15 years; (iv) the number of old people (over 65) would grow steadily over the next 30 years, the increase amounting to at least 2,300,000 and very probably much more. The proportion of old people to the total would increase considerably.

Vitamins are substances occurring in many foods in small amounts. A number of the V. are necessary for the healthy functioning of the body. As far back as 1881 Lunin discovered that certain unknown factors in the diet were essential for growth. Subsequently Sir F. Gowland Hopkins (q.v.) estab. the presence of such substances in milk. For these Funk suggested the name 'vitamines,' later modified to 'vitamins' by Sir Jack Drummond. After considerable research the chemical nature of these 'accessory food factors' was determined. They were separately distinguished alphabetically as A, B, C, etc., but more recently other names have been given to indicate their chemical constitution. The V. which so far have been shown to be necessary for health in man are vitamin A, vitamin B₁, some components of the vitamin B₂ complex, and V. C, D, and K. E, F, and P may also have some significance.

Vitamin A includes A₁, or xerophthol, and β -carotene. The best sources of this vitamin are halibut-liver oil, cod-liver oil, liver, milk, cheese, and fortified margarine. As carotene it occurs in green vegetables and carrots; both parts of vitamin A occur in eggs and butter. Deficiency of this vitamin leads to

diminished growth, diminished powers of dark adaptation progressing to night-blindness, skin eruptions, and degenerative changes in the eye.

Vitamin B₁ (aneurin or thiamine) is found in dried wheat germ, rice germ, and other unmilled cereals, barley, oatmeal, legumes, eggs, milk, and liver. Its absence leads to polyneuritis and to inadequate growth and gastro-intestinal disturbances in infants. The disease beriberi is common among Far E. pops subsisting too exclusively on 'polished' rice (i.e. rice from which the vitamin B₁ has been removed by over-milling).

Vitamin B₂ is a complex of at least 9 V. (nicotinamide, riboflavin, pyridoxine, pantothenic acid, *p*-aminobenzoic acid, inositol, choline, biotin, and folic acid). Three of these are needed by man. **Nicotinamide** is important as a preventive of pellagra; it is found in yeast and liver, fish, meat, pulses, and whole wheat-meal. **Riboflavin** occurs in yeast, liver, milk, kidney, and egg-white; deficiency causes cracked lips and mouth, and changes in the cornea. **Folic acid**, or pteroylglutamic acid, is found in liver, kidney, yeast, and many plants. It stimulates production of the red blood cells and has been found of value in the treatment of certain types of anaemia. **Biotin** is identical with vitamin H. It was isolated from egg-yolk and has been shown to be essential for the growth of many micro-organisms; biotin deficiency has been produced in man by feeding with large amounts of raw eggs or dried egg-white, with resultant loss of hair and dermatitis.

Vitamin C (ascorbic acid) occurs in fresh lemons, limes, and oranges, tomatoes, green salad, rose hips. Scurvy is due to absence of this vitamin. In the 18th cent. scurvy was eradicated from the Brit. Navy by giving sailors plenty of lemons, limes, and oranges.

Vitamin D, the anti-rachitic vitamin, prevents rickets and osteomalacia (softening of the bones). It has the power of controlling the deposition of calcium and phosphorus in the tissues. The 2 most important forms are D₂ (calciferol), prepared by the ultra-violet irradiation of ergosterol, and D₃ (irradiated 7-dehydrocholesterol), present in fish-liver oils, fresh vegetables, butter, and milk. The sun produces vitamin D in the body by ultra-violet irradiation of ergosterol and dehydrocholesterol, substances which are present in the skin.

Vitamin E (tocopherol), the anti-sterility vitamin, is found in wheat germ and green leafy vegetables. Deficiency is believed to cause reproductive failure, muscular dystrophy, and degenerative changes in the kidney.

Vitamin F is a synonym for the nutritionally essential unsaturated fatty acids (linoleic acid, linolenic acid, and arachidonic acid). Deficiency has not been recorded in humans, but claims have been made for its use in the treatment of eczematous conditions.

Vitamin K plays an important part in the regulation of liver function. Its

deficiency lowers the power of the blood to coagulate, leading to certain haemorrhagic conditions. Sources of vitamin K are fish meal, cabbage and spinach leaves, cauliflower, and other vegetables.

Vitamin P, the flavone factor in lemon juice (citrin), is said to control the fragility of capillary blood vessels.

See I. J. Harris, *Vitamins in Theory and Practice*, 1955; F. Bicknell and F. Prescott, *The Vitamins in Medicine*, 1953. See also FOOD AND DIET.

Vitebsk: 1. Oblast in N. Belorussia, a moraine area traversed by the R. W. Dvina, partly covered by mixed forests. Pop. (1956) 908,000, mostly Belorussians (before the war many Jews). It has flax and dairy farming, textile and wood-working industries. The prin. tns are V., Polotsk, Orsha.

2. Cap., economic and cultural centre of the above, on W. Dvina. There are textile, engineering (tools), and wood-working industries, and it is a railway junction. It has 12th-19th-cent. architectural monuments. Pop. (1956) 128,000 (1913, 109,000; 1920, 80,000; 1939, 167,000). V. has been known since 1021, became cap. of V. principality in 1101, Lithuanian in 1320, and Russian in 1772 (prov. cap.). Bitter fighting took place here in 1944.

Vitellius, Aulus (AD 15-69), Rom. emperor. He became the commander of the Rom. legions on the lower Rhine. In AD 69 he was proclaimed emperor (2 Jan.) by the legions, but on the approach of Vespasian's ally Antonius Primus he was murdered (22 Dec.).

Viterbo: 1. Prov. of Italy, in NW. Lazio (q.v.). It is largely in the Apennines (q.v.), but has a coastal plain on the Tyrrhenian Sea in the W. The valley of the Tiber (q.v.) is in the E. The Lake of Bolsena (q.v.) is in the N. of the prov., and there is another lake, Vico, in the S. The prin. tns include V. and Civita Castellana (qq.v.). Area 1418 sq. m.; pop. 264,000.

2. It. tn, cap. of the prov. of V., 38 m. NNW. of Rome (q.v.). It became the residence of the Popes in 1257 and was for a time a tn of importance. It was badly damaged during the Second World War. The old part of the tn preserves its medieval appearance, and there are a 12th-cent. cathedral, sev. fine old churches, and a papal palace (1266-7). Pottery and textiles are manuf., and there is a trade in agric. produce, wine, and oil. Pop. (tn) 31,500; (com.) 41,350.

Viti Levu, see FIJI ISLANDS.

Vitim, navigable right trib. of R. Lena in Siberia, rising in the Transbaikalian mts. Length 1200 m. Its lower course traverses the rich V. gold-mining area, which has sev. labour camps. The chief port is Bodaybo (q.v.).

Vituous Intromission, see INTROMISSION.

Vitis, family Vitaceae, genus of 70 species of deciduous and evergreen climbing shrubs, with tendrils. *V. vinifera* is the Common Grape Vine, native to the Caucasus; *V. coignetiae*, Japan, *V. flexuosa*, and *V. thunbergii*, Orient, are hardy and grown for their ornamental colourful leaves.

Vittoria: 1. (Eng. Vittoria), Sp. tn, cap. of the prov. of Alava. During the Peninsular war (q.v.) the French were decisively beaten here by Wellington in 1813. It is a picturesque tn with a Gothic cathedral, and many other old buildings. A new cathedral is being built. Paper and leather goods are manufactured, and there is a trade in agric. produce and wine. Pop. 59,100.

2. Tn of E. Brazil, cap. of the state of Espírito Santo. It exports iron ore, coffee, cacao, and other tropical produce. Its industries are steel smelting, sugar refining, cotton weaving, and the manuf. of footwear and mineral waters. Pop. 55,000.

Vitreous Rocks, see IGNEOUS ROCKS.

Vitrified Forts, term sometimes applied to the camps and forts with timber-reinforced stone ramparts dating from the latter part of the Early Iron Age in the highlands of Scotland and in N. France. Finavon, near Forfar, is an example which has been excavated by modern archaeological methods. The ramparts, faced with roughly squared blocks of stone, are tied to a rectangular lattice of timber beams filled with rubble. The beams have often been completely burnt, intentionally or by accident or in war, and the filling of rubble has thus become a vitrified mass. Such forts are not thought to be related to the *murus gallicus* constructions recorded in Gaul by Caesar. See EARTHWORK; HILL-FORTS.

Vitriol (Lat. *vitrum*, glass), metallic sulphates that form glassy crystals. Blue V. is copper sulphate, white V. is zinc sulphate, green V. (copperas) is ferrous sulphate. Oil of V. is sulphuric acid. See SULPHURIC ACID; COPPERAS; ZINC.

Vitriol, Oil of, see SULPHURIC ACID.

Vitro-Varnish Painting, art practised in Venice in the 15th cent., but now almost lost. Varnish highly coloured for painting was mixed with 5-10 per cent of burnt-glass powder, the resulting substance being applied with a fine brush (as in gesso-painting) to any surface. When dry the effect produced was that of glass in relief.

Vitruvius, correctly Marcus Vitruvius Pollio (1st cent. BC), Rom. architect and writer, was an official under Augustus, to whom he dedicated his famous book on architecture and building-construction, *De Re Architectura*, to which we owe much of our knowledge of Rom. building methods and of Gk buildings which have perished since his day. A copy of this book was discovered in the 15th cent., printed, and trans. into many languages.

Vitry-le-Francois, Fr. tn, cap. of an arron., in the dept of Marne, on the Marne. It was built to a definite plan by Francis I (q.v.) in 1545. It was almost destroyed in the Second World War, but is being rebuilt. It has mechanical and pottery manufs. Pop. 7600.

Vitte, see WITTE.

Vittoria, Duca della, see DIAZ, ARMANDO.
Vittoria, Tomaso Lodovico, see VICTORIA, TOMÁS LUIS DE.

Vittoria: 1. Tn in Sicily (q.v.), 11 m. WNW. of Ragusa (q.v.). It is named

after Vittoria Colonna (q.v.). It has a cathedral and an anet castle, and has a trade in wine and gypsum. Pop. 37,000.

2. City of Spain, see VITORIA.

Vittorio Veneto, It. tn, in Veneto (q.v.), 22 in. N. of Treviso (q.v.). It has a cathedral and many old houses. There are saline and sulphur springs, and silk and cement are manuf. It was the scene of a great battle during the First World War (see next article). Pop. (tn) 14,300; (com.) 25,200.

Vittorio Veneto, Battle of, 24 Oct.-4 Nov. 1918. This battle of the Piave line (Italy) brought about the rout and surrender of the Austrian forces during the First World War. The summer campaign of 1918 was very successful for the Allies, who had forced the Austrians back to W. of the Piave. The Brit. force under Lord Cavan was on the left of the line. An advance was made during Oct. which drove the Austrians back to the Livenza, and towards the end of the month the British were about Ramera. A further advance in a N.E. direction towards Sacle broke the Austrian line and separated the Austrians in the mts from those in the plain. See also WORLD WAR, FIRST.

Vitus, St. It. martyr who suffered perhaps under Diocletian. His aid is invoked against St Vitus's Dance (*Chorea*), hydrophobia, and other complaints, and he is the patron saint of dancers. His feast is on 15 June.

Vivaldi, Antonio (c. 1675-1741), It. violinist and composer, b. Venice, where he learnt music from his father, a violinist in St Mark's, and Legrenzi. He was ordained priest in 1703, and taught music at the Ospedale della Pietà until 1740, with a 3 years' absence at Mantua in the 1720s. He then went to Vienna, where he d. in poverty. V. is by far the most interesting and individual of the It. violinist-composers of his time, and though long neglected, one of the most original masters contemporary with Bach, who indeed appreciated him so much as to arrange sev. of his concertos. V. wrote over 40 operas, 2 oratorios, church music, secular cantatas, 23 symphonies, and 46 *concerti grossi*, but his real importance lies in some 450 concertos for various solo instruments and combinations of instruments, the majority of the violin family, but also woodwind and such rare things as piccolo, viola d'amore, and mandolin. He also wrote 73 sonatas for 1 and 2 violins, and for cello. See studies by M. Abbado, 1942; G. Guerrini, 1951; S. A. Luciani, 1939; M. Pincherle, 1948 (with thematic catalogue); and *Lettere e dediche*, ed. by O. Rudge.

Vivarini, family of It. painters, of Murano, Venice, of some importance in the development of Venetian painting. The most prominent members were: **Antonio** (fl. mid-15th cent.); **Bartolommeo** (fl. 1450-99), the pupil of Antonello di Messina, who taught him to paint in oils; and **Luigi** or **Alvise** (c. 1446-1502), a portrait painter.

Viverra, see CIVET.

Vives, Juan Luis, more commonly known as **Ludovicus Vives** (1492-1540), Sp. scholar and humanist, b. Valencia. He was a friend of Erasmus and More. He became prof. of humanities at Louvain (1519), and 4 years later was appointed tutor to Princess Mary of England, for whom he wrote *De ratione studii puerilis epistolae duae*, 1523. He opposed Henry VIII's divorce, and from 1528 lived in Bruges. His works include a famous commentary on St Augustine's *City of God*, 1522.

Vivisection, dissection of, and experiment upon, living animals. In its present legal sense, the term V. is limited to vertebrates. V. is an anct practice, Galen being one of its exponents. It is claimed that by V. alone was it possible to discover much physiological and pathological knowledge, e.g. the circulation of the blood and the value of therapeutics. This, however, is denied by many, who say that nothing has been discovered with the aid of V. that could not have been discovered without it. See also ANTI VIVISECTION; MEDICAL RESEARCH.

Vivonne, Catherine de, see RAMBOUILLET.

Vizagapatam, tn of Andhra State, India. V. is the only natural protected harbour on the Coromandel coast, and there is now a large shipbuilding yard. The suburb Waltair is a favourite seaside resort.

Vizcaya (Eng. *Biscay*), Sp. prov. on the Bay of Biscay, one of the Basque Provs. (q.v.). It is very rich in minerals, iron, lead, copper, and zinc being found. Stock-raising, agriculture, and fishing are also important. The cap. is Bilbao (q.v.). Area 832 sq. m.; pop. 584,700.

Vizcaya, Golfo de, see BISCAY, BAY OF.

Vize, Vladimir Yul'yevich (1888-1964), leading figure in Soviet Arctic studies, b. St Petersburg, studied chemistry in Germany and physics in Russia. He took part as geographer in G. Ya Sedov's attempt to reach the N. Pole in 1912-14. He specialised in sea ice studies and was a pioneer in the subject, also writing widely on the hist. of exploration. He participated altogether in 14 arctic expeditions between 1910 and 1937, and was closely connected with the organisation of the Soviet N. Polar drifting station, 1937-8. He was deputy director of the Arctic Institute, Leningrad, from 1930 until his retirement. He greatly influenced the great surge of scientific endeavour in the Soviet Arctic between the wars. See *The Polar Record*, Vol. 7, No. 50, 1955.

Vizetelly, Henry (1820-94), publisher and pioneer of the illustrated Press, b. London of It. extraction. He started the *Pictorial Times*, 1843, and the *Illustrated Times*, 1855, and became Paris correspondent to the *Illustrated London News*, 1865, afterwards publishing *Paris in Peril*, 1882, an account of the siege. He estab. a publishing firm in London (1879), which issued trans. of Fr. and Russian novels. He trans. most of E. Zola's novels, for which he was prosecuted. He wrote *Glances Back Through Seventy Years*, 1893.

Vizeu, see VISEU.

Vizier (Arabic *Wazir*), title first given to the chief minister of the Abbasid caliphs, subsequently applied to the chief minister of the Turkish sultan, and to the chief minister of other Muslim states.

V. J.-Day, 15 Aug. 1945, on which, with 16 Aug., was celebrated the defeat of Japan in the Second World War, the Japanese having formally accepted, on 14 Aug., terms of unconditional surrender.

Vladikavkaz, see **ORDZHONIKIDZE**.

Vladimir, St (Vladimir I, Grand Duke of Kiev) (956-1015), patron Saint of Russian Christians. Before his marriage to the sister of the Byzantine emperor V. was baptised, and he called in the Gk clergy to evangelise his country. His feast is on 15 July.

Vladimir, name of 2 outstanding princes of Kiev. See **KIEVAN RUSSIA**.

Vladimir: 1. Oblast in Central Russia, E. of Moscow. It is a region of forested lowland, with large peat deposits. Area 10,350 sq. m.; pop. (1956) 1,353,000, Russian. There are large engineering, textile, and glass-working industries dating from the 16th-17th cents.; there are also old handicrafts (linen, silk, wood-carving). Grain and potatoes are grown, and there is mkt gardening (V. cherries) and dairy farming. The prin. towns are V., Kovrov, Murom.

2. (Or V.-na-Klyaz'me), cap., economic and cultural centre of the above, 120 m. E. of Moscow. It has large engineering (tractors, automobile parts) and chemical industries, and is a treasury of Russian 12th-early 19th-cent. art, including the magnificent cathedrals of the Assumption (1158-61) and St Demetrius (1193-7) and the beautiful church of Intercession at Bogolyubovo near by. The notorious "V. Isolator" for important political prisoners is situated here. Pop. (1956) 181,000 (1914, 47,000; 1920, 24,000; 1939, 67,000). V. was founded by Vladimir Monomakh as a fortress in 1116, was cap. of Central Russia 1157-1238, became Muscovite in 1364, and a prov. cap. in 1778. Its industrial development dates from the 1930s.

Vladivostok, city on the W. shore of the Sea of Japan, in Peter the Great's Bay, cap. of the Maritime Kray (q.v.) and the most important economic and cultural centre of the Russian Far East. It is a terminus of the Trans-Siberian Railway (5732 m. from Moscow) and the N. Sea Route (q.v.), centre of communications for Russian Pacific ters., the largest Russian port in the Pacific, and the chief base of the Pacific Fleet. There are engineering (shipbuilding, mining equipment), fishing, and whaling industries. It has a branch of the U.S.S.R. Academy of Sciences, and the Far Eastern Univ. (founded 1899 as Oriental Institute, univ. from 1920, abolished 1938, reopened 1956) is situated here. Pop. (1956) 265,000 (1897, 29,000; c. 1914, 120,000; 1926, 108,000; 1939, 206,000), Russians (until 1937 also Chinese and Koreans). V. was founded as a Russian port in 1860, has been a tn since 1875, and became cap. of the Maritime region in 1888; it rapidly developed as a free port (supplies for

Russian Far E. and transit from Manchuria), naval base, and fortress, and had a pronounced international character until the 1930s. In both world wars it was used for Allied supplies. During 1918-22 it saw Allied occupation under Jap. leadership and various pro- and anti-Bolshevik govs.

Vlasov, Andrey Andreyevich (1900-46), Russian gen., leader of the anti-Communist movement among the Soviet prisoners of war and civilian deportees in Germany during the Second World War. The son of a peasant, V. served in the Red Army from 1919. In 1938-9 he was military adviser to Chiang Kai-shek, and in 1941-2 distinguished himself in the defence of Kiev and Moscow. Taken prisoner in 1942, he was persuaded by Russian sympathisers among Ger. officers to assume the leading role in the Russian anti-Communist movement. In Nov. 1944 a Committee for the Liberation of the Peoples of Russia was set up with V. as chairman. V. had no authority over the Russian units in the Ger. Army till Jan. 1945. In May 1945 V. surrendered to the Americans, and was handed over to the Soviet authorities and executed. See G. Fischer, *Soviet Opposition to Stalin* (Cambridge, Mass.), 1952.

Vlissingen, see **FLUSHING**.

Vlonë, Albanian name for Avlona (q.v.).

Vltava (Ger. *Moldau*), riv. of Czechoslovakia, which rises in the Forest of Bohemia (q.v.) and flows SE. and then N. to join the Labe (see **ELBE**) at Mělník (q.v.). It passes České Budějovice and Prague. Length 270 m.

Vocalisation. As a phonetic term, V. would indicate the action of making vocal or sonant, i.e. of forming voice sounds, or the modes of utterance or pronunciation of voice sounds, esp. of vowel sounds. As a musical term, V. indicates the use of singing voice, the action of producing musical sounds with the voice, especially singing to vowel sounds. As a graphic term, V. means vowel-representation in consonantal alphabets (such as Heb., Arabic, Syriac, and other Semitic alphabets). The absence of vowel-letters is not as strongly felt in Semitic as, e.g. Indo-European languages, because the former are essentially consonantal, and the vowels serve principally to denote grammatical variations. However, in the 5th to 8th cents. AD subsidiary and inadequate systems of V. or vowel-representation were introduced in Syriac, Hebrew, and Arabic, consisting mainly in diacritical marks (dots, little dashes, etc.). See also **ALPHABET**; **HEBREW LANGUAGE**, **WRITING**, and **LITERATURE**; **VOICE** and **VOICE TRAINING**.

Vocational Training, a term often contrasted with academic or liberal education, to describe training in skills and techniques of commerce or industry for the purpose of making competent practitioners (see **TECHNICAL EDUCATION**; **COMMERCIAL EDUCATION**). The prestige enjoyed by the occupation or profession tends to determine whether the training undertaken for it is regarded as vocational

or not. Thus professional studies in theology, law, and medicine have long enjoyed a high reputation. General education provided through the 7 liberal arts came to be regarded throughout Europe as most suitable for educ. men in other walks of life. Scientific and technological studies were reluctantly accepted as worthy of inclusion in the curricula of schools and colleges. More recently manual training, arts, and crafts have been included more for their aesthetic and therapeutic than for their general educational value. This dichotomy is sometimes held to stem from the views expressed by Plato in his *Republic*. It has led to a state of affairs in Europe where technical, commercial, and professional courses at all levels are offered in special institutions, e.g. in technical univs. or technical schools. It is a tradition that fails to accept that all training may be education and that much education may be training. This pattern has, to a greater or lesser extent, been copied in many areas of the world where European education has been influential. It has created considerable difficulties for those countries which now wish to raise their standard of living through rapid economic and industrial development. In contrast, the movement towards vocational and professional training at the highest level has been rapid in the U.S.A. The views expressed by John Dewey (q.v.), whilst by no means accepted by all educators, command wide support.

Vodka, the national spirituous drink of Russia, distilled from potatoes, rye, or other grain, and highly alcoholic.

Voges, see **VOSGES**.

Voghera (ancient Iria), It. tn, in Lombardy (q.v.), 14 m. SW. of Pavia (q.v.). It has a 17th-cent. cathedral, and a 13th-cent. castle. The tn is a railway junction and agric. mkt., and there are engineering, textile, and food-preserving industries. Pop. (tn) 27,500; (com.) 32,500.

Vogt, Alfred (1879-1943), Swiss ophthalmologist, b. Menziken, qualified in medicine, 1904. He was prof. of the univ. eye clinic at Basel from 1923 to 1927, when he moved to a similar post at Zürich. He perfected the technique of slit-lamp microscopy of the eye, and wrote *Atlas der Spaltlampenmikroskopie des lebenden Auges*, 1921.

'Vogue', international fashion magazine, pub. in separate native eds. in Great Britain, the U.S.A., and France, reports fashions, not only in dress but in beauty, decoration, and the arts. The Brit. ed., founded in 1916, is pub. monthly.

Voguls, see **MANSI**.

Voice and Voice Training. *The Singing Voice.* The vocal cords, set horizontally in the larynx, do not actually create sound; they produce eddy currents (vortices) as they open and close, one eddy or vortex at each complete vibration to and fro. A vowel is merely shaped vibration. Every vowelised tone has a central core or main stream called sound column (a better term is sound-beam). The sound-beams of the different vowels, and the different directions they take, are

the singer's most valuable 'tools.' Voice training, therefore, must include accurate knowledge of the behaviour of these beams, varying as they do in width, height, and location (tonal focus or tuning) according to the pitch and vowel.

The categories of voice are: soprano, mezzo, contralto, tenor, baritone, bass (including the *basso cantante*, singing bass, actually a big baritone with a bass timbre running through the entire voice). Each category is distinguished by the characteristic timbre or quality of the voice, never by its compass. Pitch is raised on an ascending chromatic scale by a triple action of the vocal cords: they get gradually shorter and thinner, with a corresponding gradual increase in tension. Only in the completely natural voice is this triple action mechanically perfect; in most voices the master's art steps into the breach to complete the mechanical three-fold action of the cords.

The main stream of the tone (sound column or beam) will take the right direction and 'tune in' to the exact point within the resonating zone to which the particular pitch belongs acoustically, provided the singer allows it to do so through appropriate vowel shaping in relation to pitch. This is the natural 'placing' of the voice. And as the direction, height, and location vary according to pitch and vowel, it is highly detrimental to 'place' or trust indiscriminately all tones (all pitches, all vowels) 'well forward on the lips, teeth, or mask,' for that spells strain and distortion. The singer must learn to discriminate between tonal focusing and reverberation; the former is of paramount importance. To relax everything except the vibrating element and adjacent parts, and the breathing apparatus, in order to give free play to the upsoaring tonal stream or beam, is a highly important factor in singing.

The Speaking Voice. The use of the voice in song and in speech is dependent on the same physiological principles. The 4 factors of vocal tone are: the breath; the note; the tone; the articulation. Speech is acquired entirely through the ear, and its musical elements remain under the control of the ear. In imitating the sounds heard the auto-power of making audible movements is developed, and these movements give a feeling of right speech. There is an auditive and a kinaesthetic element in speech. Breathing for the speaking voice needs to be even more easy and controlled than for song. The note is produced by the outgoing air vibrating the 2 small membranes called vocal cords. In speaking, the note is constantly gliding up and down the scale; in song it moves by quick steps, and its pitch and duration are exactly measured; it is therefore essential to train the speaking voice, so that the ear may grow to appreciate differences of pitch and musical quality. The range of the speaking voice is roughly from A to A in women, and an octave lower for men. The vowels result from the resounding of the air in the neck, throat, and mouth. They

can be whispered without voice, when they will be found each to have a specific pitch. For the vowel sounds, see under PHONETICS. See A. Randegger, *Singing*, 1878; A. B. Bach, *The Principles of Singing*, 1885; Sir R. Paget, *Human Speech*, 1930; W. W. Shaw, *Voice Production*, 1930; T. H. Pear, *Voice and Personality*, 1931; Blanche Marchesi, *A Singer's Catechism and Creed*, 1932; E. Herbert-Caesari, *The Science and Sensations of Vocal Tone*, 1936, *The Voice of the Mind*, 1950, and *Tradition and Gigli*, 1958; Gwynneth Thurburn, *Voice and Speech*, 1939, *New Speech*, 1949; W. A. Alkin, *The Voice*, 1951.

Voile, fabric of cotton, wool, or silk, with a fine, open mesh.

Volvodina, autonomous prov. of Serbia, Yugoslavia, lying N. of the riva Danube and Drava. Prior to the First World War it formed part of a Hungarian dist. estab. in 1849 as a concession to Serbian nationalism (see BANAT). It was temporarily re-occupied by Hungary during the Second World War. The pop. is very mixed, and the prov. is one of the chief agric. regions of the country. The princ. tns are Novi Sad (the cap.), Subotica, and Zrenjanin (qq.v.). Area 8680 sq. in.; pop. 1,713,900.

Volapük, see ESPERANTO; IDO.

Volaterrae, called by the Etruscans Velathri, one of the 12 cities of the Etruscan Confederation. Its dominions extended eastwards to Arretinum, westward to the Mediterranean, and southward to its colony Populonia. Its influence was due mainly to its ports, Luna and Populonia. The modern tn (Volterra, q.v.) contains interesting Etruscan remains.

Volcae, Celtic tribe of Gallia Narbonensis, who lived in the region between the Pyrenees and the frontiers of Aquitania along the coast as far as the Ithône. They were autonomous, were not subject to the Rom. provincial governor, and also possessed the Jus Latii. Their chief tn was Tolosa (modern Toulouse).

Volcano. A V. is a vent in the earth's crust from which lava, volcanic ash, and gases are ejected. If the vent is in the form of a fissure it is not commonly called a V. The term volcano is generally restricted to those conical mts which are built up by material ejected by means of a central throat or pipe. At the top of the cone is a pit-shaped opening called the 'crater.' V.s, however, exhibit 2 prin. types of eruption: (1) the explosive type; (2) the quiet type. In the former the materials are ejected with explosive violence, while in the latter the lava rises up into the crater and flows over the rim or breaks through the sides. Of the first type the best known are Vesuvius (q.v.) and Stromboli.

Smaller volcanic cones exist in the Phlegrean Plain near Naples, and these, nearly extinct, discharge only carbon dioxide and sulphurous gases. This stage is known as the solfataric stage. The eruption of Krakatoa (q.v.), between Java and Sumatra, which took place in 1883, after a period of 200 years' quiescence,

was an eruption of extremely explosive violence. In 1902 2 eruptions occurred in the is. of St Vincent and Martinique in the W. Indies, the phenomena being practically the same in both cases. 26,000 people in St Pierre, Martinique, were killed. In the Hawaiian Is. the volcanic eruptions are of the quiet type. Mauna Loa is the largest of 4 volcanic cones in the is. of Hawaii, and rises over 30,000 ft from the ocean floor. In Iceland 3 types of eruptive vents are considered: (1) cones built of ash and lava; (2) cones built of lava alone; (3) chains of craters. The first 2 correspond to the Vesuvian and Hawaiian types. The third type is common in Iceland. Eruptions which are strictly not from V.s are those described as fissure eruptions. These are lava flows which cover thousands of sq. m., and are known in the basin range of N. America (Snake R. plains), in the Deccan plateau of India, and in Antrim, Mull, Skye, the Faroes, Iceland, and parts of Greenland.

Regarding the occurrence of V.s, it is found that though a few occur isolated, yet as a rule they are met with in extended lines, and are usually situated on important lines of fracture. V.s may occur in mid-ocean, as in Hawaii and Iceland; in mid-continent, as in the Belgian Congo, and along the recently formed mt chains of the Alpine belt and the belt encircling much of the Pacific. Extinct V.s are found in comparable situations, either where the crust has been deeply fractured or where it has been distorted during mt building movements. The type of eruption depends largely on the amount of gas contained within the rock melt or magma and on whether or not it is free to escape readily. The most violent eruptions occur when large volumes of gas are suddenly released due to a sudden drop in the pressure confining the magma rising through the vent of the volcano. Eruptions can be predicted in certain circumstances; some V.s exhibit a cycle of activity which is roughly constant. More accurate predictions have been made by observing the very small tilting of the ground that may precede the eruption by a few hrs, and by the recording of changes in the local magnetic field near the V. caused by the uprise of the hot magma, which is above its Curie point and thus non-magnetic.

See also AGGLOMERATE; BOMB; LAVA. See A. Harker, *The Natural History of Igneous Rocks*, 1909; G. W. Tyrrell, *Volcanoes*, 1931; S. N. Coleman, *Volcanoes New and Old*, 1950.

Vole, name given to various species of rodents. The water V. or water rat (*Arvicola amphibius*) is about 1 ft long from nose to tip of tail. Its fur is thick and shining, rich reddish brown above and yellowish grey beneath. Its feet are not webbed, although it takes readily to water. It feeds chiefly on the stalks of sedges and other aquatic plants, and is of service in helping to keep water-courses clear. The field V. (*Microtus agrestis*) occasionally occurs in swarms, causing heavy losses to crops. See also LEMMING; MUSK RAT.

Volga (anct Rha), longest riv. (2300 m.) and one of the chief waterways of Europe. It lies entirely in Russia, rising in the Valdai upland NW. of Moscow and flowing roughly E. to Kazan' and then S. into the Caspian Sea, where it forms a large delta. Typical of the V. is a low left bank and high right bank, especially between Gor'kiy and Stalingrad, where it flows along the V. upland. It is free from ice for 150-250 days a year, is largely fed by water from melting snow, and therefore has high and long spring floods. Its chief tribs. are the Kama (q.v.) on the left and the Oka (q.v.) on the right, both longer than the Rhine. Total drainage area 533,000 sq. m. The V. traverses almost all the landscape zones of the Russian plain, from forest to semi-desert (below Stalingrad). In its basin lie 2 of the biggest industrial areas of Russia, the Moscow area between the V. and the Oka, and the Urals in the basin of the Kama. There are large deposits of oil, natural gas, oil shale (see VOLGA-URALS OIL AREA), salt, and peat. V. is navigable almost throughout its course and has over 70 navigable tribs., with the total length of the waterways exceeding 16,000 m. V. and its tribs. carry two-thirds of all goods and over a half of all passengers transported on internal waterways of the U.S.S.R. The main goods are timber, oil, mineral building materials, grain, and salt. The chief ports on the V. are Gor'kiy, Kazan', Kuybyshev, Stalingrad, Astrakhan', Saratov, Yaroslavl', and Rybinsk, most of them industrial cities situated where the riv. is crossed by railways. Artificial waterways connect the V. with the Baltic and White Seas (see MARINSKIY WATERWAY; WHITE SEA-BALTIC CANAL), the Don (see VOLGA-DON CANAL), and Moscow (see MOSCOW-VOLGA CANAL). The building of the Kuybyshev, Saratov, Gor'kiy, and other large hydro-electric stations makes the V. one of the main sources of power supply in the country, while the stations' high dams transform the riv. into a series of artificial reservoirs (see KUYBYSHEV; RYBINSK RESERVOIR) with lake-like conditions of navigation. The former fish resources of the V. have been depleted since the 1930s by pollution and the construction of the dams. In the Middle Ages V. formed a part of the trade route from N. Europe to Central Asia. On its banks rose the medieval states of Volga Bulgarians and Khazars, the Golden Horde, and the Kazan' and Astrakhan' khanates (qq.v.). The area between the upper V. and the Oka was the cradle of Muscovy (q.v.), which absorbed the whole of the V. basin in the 16th cent. See also under the names of the main V. cities.

Volga Bulgarians, Turkic-speaking medieval people who lived on the middle Volga and Kama, where they came in the 7th cent. from the steppes N. of the Sea of Azov. They originally belonged to the Hun confederation, then formed a separate state with Bulgar (q.v.) as cap.; they were under Khazar (see KHAZARS) suzerainty till the 10th cent., independent

till 1236, then under the suzerainty of the Golden Horde (q.v.) till the 15th cent. The state later existed as Kazan' Khanate (q.v.). Chuvashes (q.v.) and Volga Tatars are descendants of V. B.

Volga-Don Canal, artificial waterway connecting the Volga near Stalingrad with the Don. It was built 1947-52, largely by forced labour. Length 63 m. The first attempt at the construction of such a canal was made in 1569 by the Turks, and constant plans were made for it from the time of Peter the Great.

Volga German Republic was formed in 1918 as an Autonomous Workers' Commune, and transformed into an Autonomous Rep. in 1924. Over a half of the pop. were Volga Germans, descendants of colonists from Germany who settled on both banks of the lower Volga near Saratov under Catherine II in the 1760s. After the Ger. invasion of Russia in 1941 the V. G. R. was abolished by a decree of the Soviet Gov. and its Ger. inhab. deported to W. Siberia. The 1957 decree on rehabilitation of the deported peoples did not include the Volga Germans. See W. Kolarz, *Russia and Her Colonies*, 1952.

Volga-Urals Oil Area (formerly called the **Second Baku**), main oil-producing area in the U.S.S.R., situated between the middle Volga and the Ural Mts. Oil extraction began in the 1930s, and by 1955 production was more than double that of the old Baku oilfields. The main centre is the Tatar-Bashkir oilfields.

Volhynia (Russian and Ukrainian Volyn'): 1. Area in NW. Ukraine comprising the V., Rovno, and Zhitomir Oblasts, with the Poles'ye (q.v.) lowland in the N. and the Volhynia-Podolia upland in the S. From the 9th cent. V. belonged to the Kievan State (see KIEVAN RUSSIA), from 988 as a principality, later becoming independent; it was fused with Galicia 1199-1340 (see KINGDOM OF GALICIA AND V.), and from the mid-14th cent. was Lithuanian. It became Polish in 1569, Russian in 1793-5, again partly Polish 1919-39, and was occupied by the Germans in 1918 and 1941.

2. The westernmost Oblast of the above, adjacent to the Polish border. Grain and potatoes are grown, cattle and hogs raised, and there is bee-keeping; there are also food and timber industries. The prin. tns are Lutsk, Kovel'. Area 7700 sq. m.; pop. (1956) 890,000, mostly Ukrainians (before the Second World War also Jews and Poles).

Volition, see WILL.

Volkhov, riv. in NW. Russia, flowing from Lake Il'men' N. into Lake Ladoga. Length 130 m. Novgorod stands on the V., which in the Middle Ages was part of the trade route from Scandinavia to Byzantium.

Volksrust, centre of an agric. dist., close to the N. boundary of the Transvaal, 175 m. SE. of Johannesburg. Here in 1904 Gandhi was convicted for breaking a law excluding Asiatic traders. Pop. (whites) 3500; (Bantus) 3145; (others) 167.

Volkssturm, force similar to the Brit. Home Guard, raised by the Germans as a last line of defence in the winter of 1944-5. The V. consisted of virtually all able-bodied Germans not in the armed forces, the term 'able-bodied' being very liberally interpreted.

Volley Ball is a form of hand tennis invented in the U.S.A. as a gymnasium game during the 1890s and popularised throughout Europe by the Y.M.C.A. It is gradually establishing itself in Britain. The game consists in banging the ball over an 8-ft net with the hands, the aim being to force the ball on to the ground in the opponents' court or to induce them to hit into the net or out of play. Only the serving side scores, service changing as soon as the serving side makes an error or commits a fault. The first team to reach 15 points wins. The 6 players of each team are ranged 3 at the net, 3 at the rear of their court, the right back serving. At each service change the players of a team rotate one place clockwise. Each team is allowed 3 successive hits, but no player may hit twice consecutively, hold on to or throw the ball, touch the net, reach into his opponents' court, or strike the ball from below knee level. The court is 60 ft by 30 ft, and the ball, about the size of a football, 12 oz in weight. The game can, of course, be played by fewer players on a smaller court.

Volos, seaport of Thessaly, Greece, on the Gulf of V. As the outlet for the agric. produce and chrome of Thessaly it expanded rapidly after annexation of the latter to Greece in 1881. It is now Greece's fourth largest port. It is the seat of a metropolitan. Pop. 51,100.

Volodga: 1. Oblast in the N. of European Russia, stretching from Lake Onega and Rybinsk Reservoir to N. Dvina riv. It is a rolling plain, half covered with coniferous forests. There are peat deposits. Area 56,900 sq. m.; pop. c. 1,300,000, mostly Russian. It has dairy farming, flax growing, and linen milling, lumbering, paper milling, woodworking, and metalworking industries; there are also old crafts (V. lace). The prin. tns are V., Cherepovets, Velikiy Ustyug. It was colonised by Novgorod in the 11th cent., and was Muscovite by 1462. It is an area of banishment.

2. Cap. economic and cultural centre of the above, on Moscow-Archangel and Leningrad-Perm' railways. It has engineering (shipbuilding, timber machinery), linen milling, and dairy industries, and a large paper plant at Sokol near by. There is an institute of dairying, and many architectural monuments of the 16th-early 19th cents. Pop. (1956) 127,000 (1914, 45,000). V. has been known since 1147, became Muscovite in 1397, and was an important trading point on the route to Siberia and W. Europe in the 15th-early 18th cents.

Volsoi, anc. It. people of E. Latium, akin to the Oscans and Umbrians, dwelling on both sides of the Liris down to the Tyrrhenian Sea. They were at war with the Romans in the 5th and 4th cents.

BC and often allies of the Aequi, but were subdued (338) and enjoyed Rom. citizenship by 304.

Volscian Dialect, see LATIN LANGUAGE AND LITERATURE.

Volismensis, Lacus, see BOLSENA, LAKE OF.

Voliniii, see ORVIETO; and see BOLSENA. **Vol'sk**, tn in the Saratov Oblast, Russia, on the Volga, 80 m. N.E. of Saratov. It has a large cement industry (since 1896). V. has been known since the 17th cent., and became a tn in 1780. Pop. (1956) 60,000.

Volstead Act (U.S.A.), see PROHIBITION.

Volsungs, heroic race prominent in old Germanic and Norse sagas, descended from Volsung, grandson of Odin.

Volt, practical unit of electromotive force (e.m.f.), so called after Alessandro Volta (q.v.). In England it was defined by order in council (1894) as being equal to 10⁹ abs. units in the C.G.S. system. See UNITS, ELECTRICAL; METROLOGY.

Volta, Alessandro, Count (1745-1827) It. physicist b. Como, noted for his electrical discoveries. He invented the electrophorus, the electrical condenser (1782), and the hydrogen lamp (1777). His most noted discovery was, however, that of the development of electricity in metallic bodies (see *Philosophical Transactions*, 1793), leading to the invention of an electrical battery and later of the 'Voltaic' (or Galvanic) pile (see *Philosophical Transactions*, xc, 1800). He was awarded the Copley medal in 1791. Collections of his works were pub. in 1816 and 1918-29 and letters (*La Correspondence de Alessandro Volta et M. von Marum*), ed. by J. Boscha, in 1904. See lives by Z. Volta, 1875, and C. Volpatti, 1927.

Volta Redonda, tn in the State of Rio de Janeiro, Brazil. This new steel city stands on a broad bend (hence its name) of the R. Paraíba, at an altitude of 1847 ft, 70 m. along the railway from Rio to S. Paulo. In 1942 it was a vil., but now has the largest steelworks in S. America, and its pop. of 35,000 has every modern industrial and social amenity.

Voltaic Cell, see CELL, VOLTAIC.

Voltaire, Jean François Marie Arouet de (1694-1778), Fr. sceptic, dramatist, and historian. b. Paris, his father being an official in the *Chambre des Comptes*; educ. at the Jesuit College Louis le Grand. By the age of 18 his literary abilities had gained him entrance into the most brilliant intellectual circles. In 1715 he was banished, and on his return in 1717 imprisoned in the Bastille for writing a scurrilous lampoon on the regent. He had already written the tragedy *Œdipe*; and on his release in 1718 it was performed with brilliant success. He now assumed the pseudonym of 'Voltaire', an anagram of Arouet l(e)une(e). In 1725, he was exiled to England. Here, as the protégé of Bolingbroke, he was welcomed in intellectual circles and became versed in Eng. politics, literature, and philosophy, the latter especially stimulating his scepticism. On his return to Paris (1729) he realised a fortune by speculation. In 1734, threatened with

arrest for his *Lettres Anglaises* (pub. without his authority), he retired with his mistress Madame du Châtelet to Cirey, Champagne. By this time he had already produced the *Lettres Philosophiques*, 1734, *Histoire de Charles XII*, 1731, and *l'Épître philosophique à Uranie*, 1732. At Cirey he wrote the plays *Alzire*, 1736, *Mérope*, 1743, *Mahomet*, 1741, the poetical satire *La Pucelle*, 1738, *Treatise on Metaphysics*, 1734, a thesis on Sir Isaac Newton, part of *Le Siècle de Louis XIV*, 1751, *Les Mœurs et l'Esprit des Nations*, 1756, *Zadig*, 1748, and other eastern tales. In 1746 he was elected to the Academy. Meanwhile, he had become



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STATUETTE OF VOLTAIRE BY JOSEPH
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the intimate correspondent of Frederick the Great and in 1750 visited Frederick at Berlin. Here he was entertained in great style, his chief occupation being to correct his patron's writings, but a disparity of temperament led to V.'s departure in 1753. The *Siècle de Louis XIV* was completed about this time. From 1756 onwards, V. spent his time at Ferney, near Geneva, beginning his anti-Christian writings in 1762. Other works of the period include *Candide*, 1759 (a novel serving as a vehicle for political and social satire), the *Dictionnaire Philosophique*, 1764, hists. of Peter the Great, of India, and of Louis XV, the *Treatise on Toleration*, 1763, and *Irène*, 1778, the

last being performed with triumphant success on V.'s return to Paris in 1778.

V.'s contemporary fame rested chiefly upon his verse tragedies, whereas afterwards it is by his stories and histories that his fame has been principally supported. After his visit to England V. showed a new maturity, abandoning his early hedonism and becoming a true 'philosopher' of his age. Hist. he sought to treat scientifically as the story of the human mind and of the advance of civilisation. He strove passionately for justice; thus in the Calas case he devoted 3 years to establishing the innocence of a Protestant father executed in 1762 on the charge of murdering his son to prevent his joining the Catholic Church. He was a sworn enemy of theocracy and the coercive power of the Church, and in the *Essay on Toleration*, 1763, and the *Philosophic Dictionary*, 1764, of which the influence was immense, he took up the work with less disguise of irony than before. He was a deist, and always believed in a social morality which he considered common to all men in all ages. Later he developed a theory of a conscience implanted by God, and finally came to a belief in a God who is goodness itself, standing in some direct relationship to man. To the gift of a unique artistry in words V. added an incomparable industry and daring, and a life of service to mankind in the ideals of tolerance, justice, and freedom. He was one of the most voluminous letter writers who ever lived; some 12,000 to about 700 correspondents are extant and afford a wealth of information about the 18th cent. There are eds. of his works by P. A. Caron de Beaumarchais (70 vols.), 1785-89; M. Beuchot (72 vols.), 1829-40; Garnierfrères (52 vols.), 1883, 1877-85.

See lives and studies by G. Lanson, 1906-12; A. Aldington, 1925; C. E. Vulliamy, 1930; A. Maurois, 1932, 1948; A. Noyes, 1936. See also J. C. Collins, *Voltaire in England*, 1908; A. Bellesort, *Essai sur Voltaire*, 1925; E. Henriot, *Voltaire et Frédéric II*, 1927; M. M. H. Barr, *A Century of Voltaire Study: A Biography*, 1929; W. F. Roddaway (ed.), *Correspondence of Catherine the Great with Voltaire*, 1931; D. Mornet, *Les Origines intellectuelles de la révolution française*, 1933; M. Leroy, *Histoire des idées sociales en France*, 1946; J. H. Brummitt, *Voltaire, Historian*, 1957.

Voltagemeter, see ELECTROLYSIS.

Volterra, Vito (1860-1940), It. mathematician and physicist, b. Ancona. He was prof. of mechanics at Pisa and Turin in 1883, and held the chair of physics at Rome from 1900. His work on the theories of electricity led him to the study of differential equations, from which he arrived at the basis of functional analysis. This he adapted to the form of integral equations (Volterrana).

Volterra (Rom. Volaterrae, q.v.; Etruscan Velathri), It. tn in Tuscany (q.v.), 31 m. SE. of Pisa (q.v.). It has remains of Etruscan (see ETRURIA) and medieval walls. The fine cathedral dates from the 13th cent., and there are sev. other

medieval churches, as well as a 14th-15th-cent. fortress. The prin. industry is the making of vases and statuettes from locally found alabaster. Boric acid is obtained from springs in the dist. Pop. (tn) 12,800; (com.) 19,100.

Voltmeter, instrument for measuring voltage. *See* ELECTRIC METERS.

Volturno, riv. of Italy, rising in the Central Apennines (q.v.) and flowing SE., then WSW. past Capua (q.v.) to the Tyrrhenian Sea (q.v.) 20 m. NW. of Naples (q.v.). Its main trib. is the Calore. In 1860 Garibaldi (q.v.) defeated the Neapolitan army on its banks. Length 110 m. *See* ITALIAN FRONT, SECOND WORLD WAR CAMPAIGNS ON.

Volume and Capacity, Measures of, *see* METROLOGY.

Volumenometer, *see* SPECIFIC GRAVITY. **Volumetric Analysis**, *see* ANALYSIS, CHEMICAL.

Voluntary Aid Detachments, *see* RED CROSS, THE.

Volunteer State, *see* TENNESSEE.

Volunteers. V. in Brit. armies were usually individuals serving at their own charges, sometimes with a view to acquiring military experience before taking a commission. When in the second half of the 18th cent. the militia (q.v.) was embodied for long periods at a time, many who would have been exempt from the military ballot or could have become so on payment of a fine chose instead to serve as V. and formed volunteer companies within the co. militia regiments. The first Volunteer Act of 1782 provided that if such companies or corps served outside their own tn or co. the rank and file would be paid, lodged, and rationed as regulars. Similar Acts in 1794, 1798, and 1802 confirmed this arrangement and also bound V. and yeomanry to act in support of the civil power in case of riots. The formation of such units had the effect of drawing off the more dependable elements from the militia, and legislation from 1804 onward was designed to discourage the enlistment of V. as such and to force them by economic and other means into the local militia. In some cases whole volunteer battalions transferred bodily into the local militia.

By 1816 all volunteer units had been disbanded. But between 1848 and 1859 distrust of France as the dominant continental power and the Duke of Wellington's warnings about the weakness of the regular forces gave rise to a V. movement among the more prosperous middle class, who formed numerous 'rifle volunteer' corps, most of which were grudgingly recognised by the gov. From 1859 to 1863 the War Office paid more attention to the movement, and the various corps were formed into battalions for administrative purposes. Many corps dating from this period still survive as Territorial units.

It is difficult to assess the military value of this force because none of the corps as such was ever in action; but in the S. African War of 1899 some provided companies which were attached to line regiments, and a new City of London

Imperial Volunteer regiment was formed. Large numbers of men from Volunteer Corps also joined the City Imperial Yeomanry, but the force remained too heterogeneous and lacked a central administration. In 1908 it was merged, with the Yeomanry, in the Territorial Force, later the Territorial Army (q.v.).



M. Ross

A SCOTTISH VOLUNTEER (c. 1887)

John Armstrong, a member of the Highland Company, 4th Lanarkshire Rifle Volunteers.

The volunteer title was revived during the First World War, when a home defence force of older men was raised. In the Second World War the Home Guard (q.v.) were at first known as Local Defence Volunteers. *See* C. Sebag-Montefiore, *The Volunteer Force*, 1909.

Volunteers, South Irish, *see* IRISH REPUBLICAN ARMY.

Völuspá ('The Sybil's Prophecy'), a cosmological and teleological poem preserved in the *Edda* (q.v.), and by most critics believed to have been composed in Iceland in the latter part of the 10th cent., though there are some who think it more likely to be of Norwegian origin. It covers almost the whole hist. of the cosmos, incorporating N. mythology and combining with pagan tradition elements of a new Christian belief.

Volute (Lat. *voluta*, curl or roll), in architecture, a spiral scroll, used especially in capitals of the Ionic Order (*see* ORDERS OF ARCHITECTURE).

Volvox, genus of small flagellate protozoa, common in ponds, and resembling green algae.

Vomiting, reflex act by which the contents of the stomach are violently ejected through the cardiac orifice, up through the oesophagus, and out of the mouth. It is caused by the presence of irritating substances in the stomach, and under such circumstances is a protective effort of the organism. It may, however, be produced by a variety of different causes: by certain drugs; by diseases such as peritonitis, gastric ulcer, kidney disease, liver disease, intestinal obstruction, etc.; by certain visual, olfactory, or other sensations; or by reflex nervous stimuli, as in the 'morning sickness' of pregnancy, which originates in the pelvic region. The treatment of V. consists of: (1) removing the cause, if possible; (2) administration of drugs which exert a sedative action on the stomach and reduce the irritability of the 'vomiting centre' in the medulla of the brain.

Vondel, Joost van den (1587-1679), Dutch poet and dramatist, b. Cologne of Baptist parents. He settled in Amsterdam as a draper, but spent much of his time writing poems and plays. V. was deeply religious and became a Rom. Catholic in 1641. He wrote much religious satire and devotional poetry, and many of his subjects were based on Biblical episodes. His later work shows the influence of classical antiquity. His majestic, fervent style exercised much influence on Ger. drama of the late 17th and early 18th cents. V. is one of the greatest tragic dramatists of his time. His works include *Joseph in Egypt*, 1640, *Jephtha*, 1659, and *Noah*, 1667. See lives by A. J. Barnouw, 1925, and J. F. M. Sterck, 1926; and J. G. Bomhoff, *Vondel's Drama*, 1950.

Voodoo, religion practised by the Negro pop. of some W. Indian is. especially Haiti. It is an active faith based on the worship of the sun, water, and other natural forces, and its rites are derived from many sources, including the drinking of blood, eating of flesh, and black magic. See J. J. Williams, *Voodooes and Obeahs: places and phases of West Indian Witchcraft*, 1933; Z. N. Hurston, *Voodoo Gods*, 1939; M. Dren, *Divine Horsemen: the living gods of Haiti*, 1953.

Voortrekkers, name given to the groups comprising the Great Trek or Boer migration from Cape Colony and Natal between 1836 and 1848, during which time 1 in 10 of the Colony's pop. took part in an exodus by way of an organised attempt to seek a country away from the British in which they might develop along their own lines.

In 1836 the trek to the N. began. At first somewhat spasmodic, the movement of the V. soon became a great outward rush. The Great Trek was in fact a piecemeal long-drawn-out movement. All the V. took, roughly, the same direction, N.E., and N. from the Cape Colony towards what is now Rhodesia; but the trek parties varied in size, and each trek had its own leader, only joining in face of danger. The trekkers moved

across the drifts of the middle Orange R., and over the open country on each side of the Vaal, a dispersion which was made less hazardous towards the end of 1837 after the defeat of the Matabeles of chieftain Moselekatshe (q.v.) by V. under Pieter Uys and Hendrik Potgieter. By the close of 1837 the Matabeles were streaming across the Limpopo and the high veld had fallen to the V. by right of conquest. To complete their independence the Boer Rep. needed access to the sea, and Retief, leader of the greatest body of V., crossing the Drakensberg Mts, sought land from the Zulu chief Dingaan. He agreed to cede land to the Boers, and invited Retief to a feast, where he massacred Retief and his companions. The main body of Boers, warned of what had happened, successfully defended themselves. Subsequently Andries Pretorius, greatest of the Boer leaders, appeared on the scene with a force of 430 farmers and took the offensive against the Zulu army, estimated at more than 30,000, and on 16 Dec. 1838 gained a decisive victory. In 1840 the Boers proclaimed Natal a rep. In 1836 the only European settlement S. of the Orange riv. had been the Cape Colony; by 1848 Natal, the Orange Free State, and the Transvaal were estab. as under European control and open to W. civilisation, a notable achievement which in the main was the work of the V.

The prin. memorials to the V. are the V. monument on Voortrekkerhoogte near Pretoria, which was dedicated in 1949, and the V. museum at Pietermaritzburg.

See G. McC. Theal, *History of South Africa since 1795*, 1908; C. F. Richardson, *South Africa from the Great Trek to the Union*, 1909; C. Fuller, *Louis Trichardt's Trek across the Drakensberg*, 1927; E. A. Walker, *The Great Trek*, 1934; M. Nathan, *The Voortrekkers of South Africa*, 1937; A. F. Hattersley, *Portrait of a Colony: the Story of Natal*, 1940.

Vorarlberg, prov. of W. Austria, bounded on the N. by Bavaria, W. by the Lake of Constance, the Rhine, and Liechtenstein, and S. by Switzerland. It is very mountainous and wooded, and is known for its beautiful scenery. Forestry, dairy-farming, and fruit-growing are the prin. occupations. There are some textile, metallurgical, and leather industries, and there are hydro-electric plants. Bregenz (q.v.) is the cap. Area 1004 sq. m.; pop. 193,650.

Vorkuta, tn in the N.E. of the Komi Autonomous Rep. (q.v.), centre of the Pechora coal basin and one of the main centres of forced labour in the U.S.S.R. It has a large coal-mining industry (since the 1930s) and is a local cultural centre. The tn largely consists of mining settlements and forced labour camps, and has a total pop. of sev. hundred thousand. The famous strike of V. camp inmates in 1953 was an important event in the political development of post-Stalin Russia. See J. Scholmer, *Vorkuta*, 1954.

Voronezh: 1. Oblast in Central Russia, S.E. of Moscow, traversed by the Don, which separates the Central Russian upland in the W. and the Oka-Don

lowland in the E. It has rich black-earth soil and a few oak forests. Area 18,300 sq. m.; pop. (1956) 1,897,000, Russian. Wheat, sunflowers, and sugar-beet are grown, and there is varied and intensive livestock breeding (Russian trotters originated here). It has engineering, chemical, and food industries. V. was unpopulated till the 16th cent. It was the scene of anti-Soviet guerilla warfare in 1919-23, and was partly occupied by the Germans in 1942-3.

2. Cap. of the above and main economic and cultural centre of the central black-earth region. It has varied engineering (agric. and food-industry equipment, excavators, diesel motors, etc.), chemical (synthetic rubber, oil-cracking), and food industries, and is an important railway junction. There is a univ. (fd. 1918 on the basis of evacuated Tartu Univ.) and an agric. institute (fd. 1913). Pop. (1956) 400,000 (1920, 90,000; 1923, 79,000; 1939, 327,000). V. was founded in 1586 as a Muscovite frontier fortress against the Tatars, was the industrial base (ship-building, etc.) of Peter the Great's Azov campaign in 1695-6, and became the prov. cap. in 1711; it has been an important commercial and cultural centre since the 1830s, and was the cap. of the central black-earth region 1928-34. Much fighting took place here during the Civil war (1919) and the Second World War (1942-3); during the latter it was greatly damaged.

Voronoff, Serge (1866-1951), Russian surgeon, b. Voronezh, and educ. in Paris, where, before the First World War, he was chief surgeon in the Russian Hospital. In 1917 he became chief surgeon in the Military Hospital. Afterwards director of the biological laboratory at the École des Hautes Études, later he became director of experimental surgery of the Station Physiologique, Collège de France. V. became celebrated for his experiments toward human rejuvenation by transference of reproductive glands (testes) from apes.

Voroshilov, Kliment Yefremovich (1881-), Russian Communist. He was a metal worker in Donbas (q.v.), joined the Russian Social Democratic Labour Party (q.v.) in 1903, belonged to its Bolshevik faction, and was active in underground work. After the seizure of power by the Bolsheviks in 1917 (see OCTOBER REVOLUTION) he helped to set up the Cheka (q.v.). During the civil war he distinguished himself both as a military and a political leader, and in 1921 became a member of the Communist Party's Central Committee. In the inner-party struggle after Lenin's death he took Stalin's side and became commissar for war and the navy in 1925 and member of the party's Politburo (q.v.) in 1926; Marshal of the Soviet Union since 1935. In 1940, after the Soviet-Finnish war, he was relieved of the post of commissar of defence, but appointed deputy prime minister. During the Second World War he was member of the State Defence Committee (q.v.), but failed as a field commander. In 1945-7 he headed the Soviet Control Commission in Hungary. After Stalin's death in 1953 he became Chairman

of the Presidium of the U.S.S.R. Supreme Soviet, i.e. the titular head of the State.

Voroshilov (re-named Ussuriysk in 1958), tn in the Maritime Kray of the Russian Far E., 70 m. N. of Vladivostok. It has soya-oil and sugar industries, and is a junction of the Trans-Siberian and Chinese E. railways. Founded in 1866, V. became a tn in 1898, and was cap. of the Ussuri Oblast 1933-43 (abolished). Pop. (1956) 101,000 (c. 1914, 52,000; 1926, 35,000).

Voroshilovgrad: 1. Oblast in E. Ukraine, comprising the central part of the Donets Basin (q.v.) and the ravined area on the l. b. of the Severskiy Donets, in the black earth steppe belt. It has large coal deposits (half anthracite). There are iron and steel, engineering, chemical, food, and light industries; wheat and sunflower are grown, milk gardening is practised, and cattle and hogs are raised. The prin. tns are V., Kadiyevka, Voroshilovsk, Krasnyy Luch. The area was unpopulated until annexed by Russia and colonised after 1753 (see NEW RUSSIA). The first colonists were Serbian immigrants. Industrial development dates from the late 18th cent. The Stakhanov Movement (q.v.) originated here. During the Ger. occupation (1941-3) the underground youth organisation the 'Young Guard' (q.v.) in Krasnodon performed heroic deeds. Area 10,300 sq. m.; pop. (1956) 2,220,000, Russians and Ukrainians.

2. (1882-1935 Lugansk) Cap., economic and cultural centre of the above, the oldest industrial centre of the Donets Basin, with large engineering and metallurgical industries (locomotives, mining equipment, machine tools, automobile parts, building industry equipment, pipes). Known since the mid-18th cent., it became a tn in 1882, and prov. cap. in 1938. A cannon foundry was built in 1796 (the first experiments in Russia in the smelting of iron with coke took place in 1797); a large locomotive plant was built in 1900, and further rapid industrial development took place in the 1930s. Pop. (1956) 251,000 (3rd in Donets Basin; 1917, 60,000; 1939, 213,000). Again re-named Lugansk in 1958.

Voroshilovsk: 1. See STAVROPOL'. 2. (until 1931 Alchevsk) Tn in the Lugansk Oblast (Ukraine), 26 m. SW. of Lugansk. It is a major centre of the metallurgical and coking industries, founded in 1895 as a settlement for workers of the iron and steel plant. Pop. (1939) 55,000 (1926, 16,000).

Vörösmarty, Mihály (1800-55), Hungarian poet, b. Kápolnásnyék. He became famous for his epic *The Flight of Zala*, 1825, but his reputation rests more securely on his lyric poetry, which includes *The Song of Fót and Szécsén*. He was a considerable critic and ed. the review *Tudománys gyűjtemény*, 1821-32. He d. in Pest.

Vortex, term used in hydrodynamics for a motion in a fluid in which the individual particles are conceived as having a circular or rotatory motion. Vortex motion is represented by a straight-line vector perpendicular to the plane of rotation,

and of length proportional to the vorticity. It can be shown that such a line or filament cannot start or end in the interior of the fluid, and that a vortex always consists of the same elements of liquid. Kelvin adopted this idea in his theory of matter as vortices in motion in the all-pervading ether. See HYDROKINETICS.

Vorticism, see LEWIS, P. WYNDHAM.

Vortigern, or **Wyrtegeorn** (fl. 449). Brit. king who, according to Bede, invited Hengist and Horsa (q.v.) to come to England, to help him against the Picts. They later quarrelled with V. and overran Kent.

Vosges, frontier dept in E. France, shut in eastward by the V. Mts, the highest Fr. peak being Hohneck (4482 ft). The Moselle and Meuse have the largest drainage areas. Coal, iron, copper, and lead are found, and there are mineral springs. Oats, wheat, and the vine are cultivated, and cheese-making and cattle-grazing are important. Large forest tracts account for the wood-working industries, but textile goods are the chief manuf. The prin. tns are Épinal (the cap.), St-Dié, and Neufchâteau (qq.v.). Area 2303 sq. m.; pop. 373,000.

Vosges Mountains (Lat. *Vogesus*), range of mts along the W. bank of the Rhine, closely resembling in many respects the Black Forest along the E. They stretch for 150 m. from Basel to Mainz, through Lorraine and Alsace. The Ballon de Guebwiller is the culminating point (4680 ft). Silver, copper, coal, lead, and rock salt are mined, and vines grown on the lower slopes.

Vostitza, see AEGIUM.

Votjaks, or **Votyaks**, see UDMURTS.

Votkinsk, tn in the Udmurt Autonomous Rep., Russia, 32 m. NE. of Izhevsk. It has a large engineering plant. Founded in 1759 as an ironworks, it has become a tn since the 1930s. In 1918 V. workers overthrew the Communists and formed V. div., which fought on the White side. Pop. (1956) 54,000 (1897, 21,000), mostly Russian.

Vouet, Simon (1590-1649), Fr. historical painter, b. Paris. V. accompanied the Fr. ambas. to Constantinople (1611), and went to Italy (1612), studying the works of Paul Veronese at Venice and of Caravaggio and Guido Reni at Rome. Louis XIII recalled him to France (1627) as his prin. painter, and gave him work in the Luxembourg, Louvre, and St Germain palaces. His 'Virgin and Child' is in the Ashmolean Museum, Oxford. In his studio many of the great decorative painters of the age of Louis XIV, e.g. Le Brun (q.v.), were trained.

Voussoir, one of the stones (usually wedge-shaped) of an arch (see ARCH).

Vowels, see ALPHABET; PHONETICS; VOCALISATION.

Voysey, Charles (1828-1912), founder of the Theistic Church; b. London, he was ordained in the Church of England, but his views became increasingly unorthodox. In 1863 he was compelled to leave St Mark's, Whitechapel, because he denied eternal punishment. Later he founded

the Church of which he remained the head until his death.

Voysey, Charles Francis Annesley (1851-1941), architect and decorative designer, b. Hestle, Yorks; was trained in London. From c. 1890 to c. 1914 he had an international reputation as a designer of houses of extreme simplicity, in contrast to mid-Victorian pretentiousness. These included sev. near Windermere, one near Sandgate (for H. G. Wells), and his own charming home—'The Orchard'—at Chorley Wood, Herts. He also designed stained glass, wallpapers, textile fabrics, and furniture.

Vrachori, or **Vrachochori**, see AGRINION.

Vratsa, tn of NW. Bulgaria, cap. of V. prov., on the N. slope of the V. Mts, 36 m. NNE. of Sofia (q.v.). It has a trade in wine and agric. produce, and has textile and steel industries. Pop. 20,000.

Vrbas, see SAVA.

Vrochlaby (Ger. *Hohenelbe*), Czechoslovak tn in the region of Liberec (q.v.), near the source of the Labe (see ELBE). It has textile manufs. Pop. 8600.

Vriendt, Frans and Cornelis de, see FLORIS, FRANS.

Vries, Hugo de, see DE VRIES.

Vriesland, see FRIESLAND.

Vrsao (Hungarian *Versecz*), tn in Serbia, Yugoslavia, in the autonomous prov. of Vojvodina (q.v.). It has a fine cathedral, and many anct buildings, is a mkt tn, and is known for its wines and brandy. Pop. 26,750.

Vryburg, cap. of V. dist., S. Africa, 126 m. from Kimberley, Cape Prov., was the cap. of the short-lived Stellaland (q.v.) Rep. It is a livestock centre, and has a butter factory and a soap works. V. is the starting-point of the Rhodesian railway system, which extends through the Bechuanaland Protectorate and S. and N. Rhodesia to the Belgian Congo. Pop.: (whites) 3774; (Bantu) 4528; (Coloureds) 709.

Vryheid (old Dutch, 'freedom'), tn of N. Natal, SE. Africa, 133 m. from Pietermaritzburg. It is the cap. of V. dist., rich in coal (at Hlobane), copper, gold, and other minerals. Once part of Zululand, it was ceded to the Boers under Meyer, proclaimed an independent 'New Republic' (1884), incorporated with the Transvaal, and annexed to Natal in 1903. Pop.: (whites) 4200; (Bantu) 4452; (others) 227.

Vulcan, see HERPHESTUS.

Vulcan, hypothetical planet. In 1859 Leverrier suggested that perturbations of Mercury's orbit, which were then unaccounted for, were caused by an unknown planet revolving nearer the sun, but no discovery has resulted from any observations, and the existence of V. is discredited. Einstein's theory has explained the discrepancy in the motion of the perihelion of Mercury's orbit.

Vulcanisation, see RUBBER.

Vulcano, see LIPARI ISLANDS.

Vulgate (Lat. *Vulgata*, 'commonly used'), name sometimes given to the Septuagint (q.v.), but principally to the Lat. version of the Bible prepared by St Jerome in the latter part of the 4th cent. He revised the N.T. at the invitation of Pope Damasus, and this part

of the V. was little more than a revision of the existing text; the O.T. version was an independent trans. from the Heb. into Lat. It was declared authentic by the Council of Trent for use in the Rom. Church. The decision of Trent did not concern critical but doctrinal accuracy, guaranteeing the substantial conformity of the V. with the original texts and its authority in matters of faith and morals.

St Jerome's trans. became corrupted, and various recensions became necessary, one by Alcuin in the early 8th cent., another by Lanfranc (1089). The invention of printing led to the issue about 1456 of the Mazarin Bible printed at Mainz by Gutenberg and Fust. A revision by Toletus at the instance of Pope Clement III was issued in 1592 and is the authorised ed. in the Rom. Church. In 1907 Pope St Pius X appointed a commission to prepare a new official version. Wycliffe's version of the Bible was made from the V., and thus that version has affected the A.V. as it has those in all the languages of Europe. The Eng. trans. of the V., known as the Douai version, was pub. in 1582 (N.T.) and 1609 (O.T.), with subsequent revisions in 1749-50 and 1881-5. A new trans. by Monsignor R. A. Knox of the N.T. came out in 1943, and of the O.T. in 1948-9.

Vulpera-Tarasp, see TARASP.

nopterus). Among the Cathartidae are some birds of great size and powerful flight, such as the condor (*Vultur gryphus*), the black V. (*Catharista atratus*), and the Turkey buzzards (*Cathartes*).

Vyatka, see KIROV.

Vyborg (Finnish *Vilpuri*, Swedish *Viborg*), tn in the Leningrad Oblast of NW. Russia (since 1944), on the Gulf of Finland, 75 m. NW. of Leningrad. It is an important industrial (agric. machinery) and transportation centre (seaport, 5 railway lines, Salma canal). Founded in 1293 as a castle, it became a tn in 1403, and was an important fortress on the Russian frontier. It became Russian in 1710 (prov. cap.), but was included in Finland in 1811. V. suffered greatly during the Second World War. It was ceded to the U.S.S.R. in 1940 (included in the Karelo-Finnish Rep.), but was again Finnish from 1941 to 1944. Pop. (1956) 51,000 (1939, 73,000); before the war Finns and Swedes, now Russians.

Vyrnwy, artificial lake in Montgomeryshire, Wales. Made in 1890-1905 in order to give a water supply to Liverpool. The name is that of a trib. of the Severn used to fill the lake, which is 5 m. in length. It is 68 m. from Liverpool.

Vyshnitskiy, **Andrey Yanuar'yevich** (1883-1955), Russian lawyer and politician of Polish descent. He joined the Russian Social Democratic Labour party (q.v.) in 1902, and after its split joined the Mensheviks (q.v.) and took an active part in the revolution of 1905 (q.v.). After the Bolsheviks estab. their power in Russia V. joined the victors (see COMMUNIST PARTY OF THE SOVIET UNION) in 1920. From 1921 he was a lecturer at Moscow Univ., then prof. and rector. From 1928 to 1931 he was head of the dept of higher education at the commissariat of education. In 1931 he became procurator of the Russian Federal Rep., in 1935 of the U.S.S.R., and in 1939 deputy chairman of the council of people's commissars. V. was the most prominent exponent of Stalinism (q.v.) in legal theory and practice. He played a leading role in the Moscow show trials of 1928-38—as chairman of the court in the Shakhly (q.v.) and Industrial party (q.v.) trials, and as public prosecutor in the Metro-Vickers (1933) trial and in the 3 main trials of the Great Purge (q.v.). From 1937 V. was dictator in Soviet legal science, to which he contributed the theory that confession by the accused was a sufficient proof of his guilt. From 1940 to 1949 and again 1953-5 he was deputy minister of foreign affairs under Molotov, and from 1949 to 1953 minister. In this capacity he had no influence on policy, being merely the mouthpiece of Stalin and the Politburo (q.v.).

Vyshniy Volochok, see VYSHNIY VOLOCHÉK.

Vyshniy Volochék, tn in the Kalinin Oblast of Central Russia, 74 m. NW. of Kalinin. It has textile and glass industries (since 19th cent.). Pop. (1956) 60,000. It is an old commercial centre, and was particularly important in 1709-1810, when it stood on the only artificial waterway between the Baltic Sea and the Volga.



Masloviski and Goodpaster

BLACK VULTURE

Vulture, bird with a strong, hooked beak, and repulsive in appearance and habits, but of considerable value on account of its food being mainly composed of carrion, which it discovers by its abnormally keen senses of sight and smell. V.s cannot, like eagles, carry food with their feet and claws, but feed their young by regurgitating from the crop, as pigeons do. They are classified in 2 families, the Accipitridae and the Cathartidae. The former include the griffon V. (*Gyps fulvus*), which occasionally reaches Britain, and the Egyptian V. (*Neophron per-*

W

W, twenty-third letter of the Eng. alphabet. As a letter it appeared only in the 11th cent. Its phonetic value in English is that of a 'consonantal u', but its name 'double u' comes from the fact that when it was created as a separate sign it was formed as a differentiation of V (which, at the time, had not only the value of *v* but also of *u*): **W**. The N.-Semitic *waw* and, its descendant, the Gk *digamma* (see **F**) probably had a similar phonetic value to that of the Eng. *w*. According to some scholars also the Lat. *V*, representing the consonantal *v* and the vocalic *u* (see **V**), was pronounced like our modern *w*. The A.-S. alphabet represented the sound *w* by the letter *wyn* (*þ*). The Germans have no sound like the Eng. *w* and employ the letter *w* for the sound *ö*. Nor have the Slavonic languages a *w*-sound; in consequence, the Czech alphabet has no *w*, and the Polish alphabet has a *w* which is pronounced like the Eng. *v*. The Polish *w* sound is expressed by the sign *ó*. In English, the letter *w* is capable of performing the functions both of consonant (as in *war*, *with*, *wine*) and vowel (as in *law* or *few*). In Welsh names it is generally a vowel (*Bethrs-y-Coed* or *Brach-y-pwll*). The French use *ou* as a substitute, and Gu for proper names (Guillaume for William). The Sp. use mostly *hu* (Huanuco, Huelva), but sometimes *gu* (Guatemala, Guadalupe). See **ALPHABET**.

Waadt, see **VAUD**.

Waal, see **VAH**.

Waal, riv. of the Netherlands. The Rhine divides, 9 m. E. of Nijmegen, into the Neder Rijn and the *W.*, the latter becoming the Merwede at its confluence with the Meuse 2 m. E. of Gorinchem. Nijmegen, Tiel, and Zalt-Bommel are the prin. tns on the *W*.

Waalwijk (*Waalwyk*), tn in the prov. of N. Brabant, Netherlands, 10 m. W. of 's Hertogenbosch. There are manufs. of shoes, chemicals, and machinery. Pop. 16,040.

Wabash, riv., 475 m. long, trib. of the Ohio, rising in Ohio, flowing across Indiana and eventually forming the boundary between Indiana and Illinois. It was hydro-electric developments and barge traffic.

Wabrzeźno (Ger. *Briesen*), tn of Poland, in Bydgoszcz prov., 38 m. ENE. of Bydgoszcz (q.v.). It is a mrkt tn, and has manufs. of bricks and furniture. Pop. 10,000.

Wace, Robert (c. 1115-c. 1183), Anglo-Norman poet, b. Jersey. His 2 most important works are his historical poems, written in octosyllabic verse. The first is the *Roman de Brut*, a history of the Britons, based on Geoffrey of Monmouth's *Historia regum britanniae*; the second is the *Roman de Rou*, based on Dudo of St Quentin and Guillaume de Jumièges. *W.* was the first to mention, in his *Brut*,

King Arthur and the knights of the Round Table, and his influence on medieval Arthurian romance was immense. See M. Polan, *L'influence du Brut de Wace*, 1931.

Wachau, the valley of the Danube in Austria between Ybbs and Krems (qq.v.). It is extremely picturesque, with crags of rock, woods, vineyards, churches, and castles. Length 40 m.

'Wacht am Rhein, Die' ('The Watch on the Rhine'), Ger. patriotic song, words by Max Schneckenburger (c. 1840), music composed by Carl Wilhelm in 1854.

Waco (so called from the Waco or Hueco Indians), cap. of McLennan co., Texas, U.S.A., on the Brazos, 186 m. by rail NW. of Houston. It is a univ. city and an important cotton mrkt. Pop. 84,700.

Wadal, dist. of Fr. Equatorial Africa, the NE. part of Chad Ter., accepted the Fr. Protectorate in 1903; since 1909 it has been part of Fr. Equatorial Africa. *W.* is bounded on the NE. by Darfur, and on the N. is the Sahara Desert. The climate is hot and dry. The cap. is Abeshr, which is the head of caravan routes connecting it to Benghazi, on the coast of Tripoli, and Brit. W. Africa. *W.* was once notorious for its trade in eunuchs and slaves. Cattle and camels are reared; gazelles, baboons, ostriches, elephants, and lions are found in the dist. Area 170,000 sq. m.; pop. about 230,000.

Waddell, Helen Jane (1889-), Brit. scholar, b. Tokyo, of Irish parents. Educ. at Victoria College and Queen's Univ., Belfast, she was a lecturer in Latin at Somerville College, Oxford, from 1920 to 1922, and after that a Fellow of Lady Margaret Hall. Her trans. include *Lyrics from the Chinese*, 1913, and *Medieval Latin Lyrics*, 1929. *The Wandering Scholars*, 1927, is an account of the Latin poets of the later Middle Ages, and she also pub. *The Desert Fathers*, 1936, and *Poetry in the Dark Ages*, 1948. In 1927 she was awarded the A. C. Benson Medal of the Royal Society of Literature.

Wade, George Edward, see **ROBEY**, SM GEORGE.

Wadebridge, mrkt tn of N. Cornwall, England, 6 m. from the coast, and at the head of the Camel estuary. A bridge of 15 arches dating from 1485 spans the riv. at *W.* *W.* is an agric. centre, and has a foundry. Pop. 3200.

Wadham College, Oxford, founded in 1612 by Nicholas Wadham of Merfield, in Somersetshire. It was built upon the site of an auct house of the Augustinian Friars, and in this college the Royal Society had its origin, and held its sittings from 1652 to 1659 in the great room over the gateway.

Wadi, or **Wady**, Arabic word (*wādī*) signifying a riv., a riv.-course, ravine, or valley. True *W.s* are riv.-courses dry except for a brief period in the rainy season; it is also of frequent occurrence in

the names of places, e.g. Wadi Halfa in the Sudan. In Spain, *wad* has been transformed into *guad*, e.g. Wādi 'l-hijārah ('river of the stones') has become Guadalajara.

Wadi-Asch, see GUADIX.

Wadi-el-Kebir, see GUADALQUIVIR.

Wadi Halfa, Halfa Prov., tn in Sudan. It is the frontier tn of the N. Provs. and the N. gateway of the Sudan. The Sudan Railway across the Nubian desert from W. H. to Abu Hamad was begun in 1897; it now extends, via Atbara, to El Obeld. Halfa prov. extends from the Egyptian frontier to the third cataract. The people are Nubians and still retain their own language, although the traders understand Arabic. The inhab. of Halfa depend almost entirely on the Nile for a livelihood. For a large part of its course through the N. part of Berber and most of Halfa the Nile is shut in by barren rocky hills, beyond which there is nothing but desert. Rainfall is scarcely measurable. See Sir H. Macmichael, *The Anglo-Egyptian Sudan*, 1934; J. A. de C. Hamilton (ed.), *The Anglo-Egyptian Sudan from within*, 1935.

Wading-bird, see COURLAN.

Wadsworth, Edward Alexander (1889-1949), artist, b. Cleckheaton, and educ. at Fettes and the Slade. He served in the R.N.V.R. during the First World War. He became A.R.A. in 1943. He was primarily a painter of abstract forms and objects, and not a figure-painter; his paintings of industrial scenes and nautical subjects are his most outstanding. He worked much in tempera and pub. (1926) a book of copper engravings *The Sailing Ships and Harbours of the W. Mediterranean and Adriatic Seas*.

Wager of Battle, see TRIAL BY COMBAT.

Wager of Law, name by which the mode of proof by compurgation continued to be employed occasionally in actions for debt until finally abolished in 1833. Compurgation was the alternative to trial by ordeal. See also COMPURGATOR.

Wages, price of labour, or that part of wealth (q.v.) which is given in exchange for labour. The ultimate source of W. as of profits (q.v.) is the value of that which capital and labour jointly produce, but in practice W. are paid in the first instance out of capital. Competition between employers tends to raise W., between labourers, to lower them. The results of competition are checked by: (1) trade unions (q.v.), and (2) Minimum Wage Acts. Under the Coal Mines (Minimum Wage) Act, 1912, dist. boards were set up to settle the rate of W. in different coal areas, and the effect generally of such Acts as this, and of the Minimum Wages Regulations under the Trade Boards Acts, 1909 and 1913, was that many workmen or labourers obtained increased rates. The outbreak of the First World War led to the postponement of further legislation to regularise W., and it was not until 1918 that the Trade Boards (q.v.) Acts of 1909 and 1913 were extended to other trades, securing a minimum wage to many millions of workers who up till then had been outside

the scope of the protection afforded by the Acts. But the fixing of a mere minimum wage in depressed trades offered no solution to the W. problem as affected by the high cost of living after 1918, and in that year the Wages (Temporary Regulation) Act became law. It had the effect of fixing as minima W. in force at the time of its passing with the provision for adjustment by an Interim Court of Arbitration. The Act was passed for 6 months only, but it was renewed in 1919, and by the Industrial Courts Act of the same year certain of its provisions were still further extended.

Since then state legislation has provided a permanent safeguard against the exploiting of workers in the trades concerned by the further extension of the facilities of the Trade Boards Acts.

Wage-fixing Systems. As among different employments, the causes that produce different rates of W. were stated by Adam Smith (q.v.) as: (1) the agreeableness or otherwise of the nature of the employment; (2) the difficulty or otherwise, and the expense or cheapness involved in apprenticeship; (3) the constancy of employment; (4) the degree of trust necessarily reposed in the workman; and (5) the chances of success in the given trade. There are various methods of fixing W., the variety being due to a corresponding variety in the demands and character of the employment. Broadly speaking, the workers' output will be larger the more nearly the method of payment is adjusted to individual results. In this connection a system of piece W. (see PIECEWORK) is a common form of remuneration. Under this plan workmen, especially where machinery is used, are paid exactly in proportion to output. The system has been for some time practised in coal mining, textile industries, and boot and shoe trades, where conditions make such a system satisfactory; but in such industries as engineering, wood-working, and building a time W. system has been found to be more effective, since the different kinds of machinery and material, besides varying quality of work, make a flat rate of piece W. difficult if not impossible to fix. Such time W. are usually paid by the hr. Another method of wage-fixing is known as task W., and is being adopted where practicable under modern factory economy. Experiments are made to determine what output a first-class workman can produce in a given time. The output thus defined is called a standard task, and the W. system is adjusted to encourage the worker to maintain the level of efficiency set by it. The plan is in operation in many of the mass-production works of the U.S.A. The success of the plan depends upon the scrupulousness of the employer, since there is a danger of exploitation, and the strong position of trade unionism in this country appears at present to make it improbable that the system will be widely adopted. (On the influence of protection on wages, see PROTECTION and TARIFFS; and on the connection between W. and prices, see PRICE.)

Wage Rates in Relation to the Cost of Living. In 1908-9 W. were depressed, but thereafter began to rise, the most marked increase being in 1912; the upward tendency was steadily maintained until the outbreak of the First World War. The increased cost of living caused by the War resulted in a rapid rise in W., though they did not keep pace with the cost of living, and wage rates rose to their peak during the industrial boom of 1920, when a reaction took place. After 1924 money wage rates, according to the Ministry of Labour statistics, remained practically unchanged at 170-175 per cent of the pre-War level, and Prof. Bowley's index of earnings showed a fall of about 1 per cent from 1924 to 1930. During the 1931 world-wide financial crisis wage rates fell considerably, and the continuance of the trade depression resulted in a further reduction.

After the Second World War wage rates climbed more or less in parallel with retail prices, until in 1956 both were more than half as much again as in 1947. Real wage rates were thus hardly changed. But the real value of *earnings* rose because of overtime and bonuses; there were also increased welfare and 'fringe' benefits.

Adjustment of Wages by Cost-of-living Sliding Scales. In a number of industries (including mining, glass, iron and steel, textile, clothing, food, drink and tobacco, woodworking, and building) collective agreements between organisations of employers and workpeople are in operation providing for the automatic adjustment of wage rates, on a pre-arranged basis, in accordance with the changes in the average level of working-class cost of living. This method of regulating wages, first introduced in certain industries towards the end of the First World War, was gradually extended to a number of other industries and services until the total number of workpeople covered by such arrangements had risen, by the year 1922, to about 3,000,000. In some industries and services these arrangements were subsequently suspended or abandoned, and by 1939 the number of people covered had fallen to about 1,500,000. During the Second World War there was a further extension of such agreements to some other important industries, including coal mining, pig-iron manuf., iron and steel manuf., cotton spinning, and weaving, and although in other industries sliding scales which were in operation at the beginning of the War were suspended or abandoned, the number of people covered had risen by June 1944 to about 2,500,000. After the War the scales in some important industries (cotton, wool, textile bleaching, etc.) were abandoned and comparatively few new scales were introduced; but by 1956 the number of employees whose wage rates were still subject to periodical adjustments under arrangements of this kind was nearly 2,500,000, or about the same as in mid-1944. Both during and after the War, increases in wage rates in these industries had not been restricted to those

taking effect under the cost-of-living sliding scale agreements, most of the workers having received additional increases in wage rates, or war bonuses, either by direct agreement between the employers' and workers' organisations or by arbitrators' awards (see *WAGES COUNCILS*). In some of the industries the terms of the sliding scale agreements have been altered so as to provide for an immediate increase, additional to the amount warranted by movements in the cost-of-living index figure (see *STANDARD OF LIVING*).

Guaranteed Annual Wage. The International Labour Conference at San Francisco in 1948 adopted a resolution on the desirability of extending the application of the principle of the guaranteed wage to wage earners who were liable to be laid off work temporarily. In Great Britain the principle of continuity of employment over a period has received little attention from the trade-union movement, but the 'annual wage' has in recent years become a major objective of Amer. labour. The term is included by the Americans in the more general expression 'a guaranteed wage,' which they use to mean a minimum guarantee over a period, not merely for a week, as in Great Britain. Before the Second World War the flour-milling industry and a few large concerns like Lever Brothers and some of the cocoa firms introduced schemes assuring their workers continuity of wages or employment, for a quarter of a year or longer, by supplementing unemployment benefit. In post-war conditions of full employment and labour shortage it was considered undesirable for the gov. to allow unemployment benefit to be used for this purpose, and changes under the new National Insurance Act forced those concerned to consider what new arrangements could be made. A guaranteed wage plan, as defined in the Latimer report, presented to the president of the U.S.A. in 1947, was a plan under which an employer guarantees to all or a defined unit or group of his employees a wage or employment for at least 3 months. In the case of an ann. wage the guarantee is for 12 months. The Latimer report favoured the principle of co-ordinating guarantees with unemployment insurance, as was done by the Brit. concerns above mentioned, but it has not hitherto been legally possible in the U.S.A. In 1955-6 transitional unemployment caused by difficulties in exporting and credit restriction increased attention to discussion of guaranteed wages, severance pay, and compensation for workers displaced by automation. See also *LABOUR, WAGES AND HOURS OF*.

See B. G. de Montgomery, *British and Continental Labour Policy*, 1923; H. Clay, *Problem of Industrial Relations*, 1929; A. C. Pigou, *Economics of Welfare*, 1929; *Report of Committee on Finance and Industry*, 1931; R. Dickinson, *Wages and Wealth*, 1931; P. H. Douglas, *Theory of Wages*, 1934; M. Dobb, *Wages*, 1946; T. E. M. McKitterick, *Wages Policy*, 1949. Wages Councils, statutory bodies set up under the W. O. Act 1945. Replaced

the Trade Boards (q.v.). By the terms of the Act the minister of labour is empowered to establish a council in any industry in which he considers adequate wage-negotiating machinery is lacking or when advised by a commission of inquiry that the existing machinery is insufficient. The function of the councils is to fix minimum rates of pay for the industry concerned, and such rates when approved by the minister are enforceable at law. Councils may also make recommendations to the minister on conditions of work and recruitment. The power of the W. C. is limited by the strength of the demand for the products or services of the industry, and by the capacity of the employers to replace labour by machinery. For example, the Wages Council established in the catering industry may have harmed catering workers as a whole by pushing catering wages up too high and making it difficult for the industry to supply service when the customer wanted it. The industry is made up of many small units: restaurants, cafés, inns, hotels, and bars of all kinds, and the work cannot be done in 'factory time.' The high rates of wages fixed for overtime have caused some catering establishments to close down altogether at some parts of the day. High wages have encouraged catering employers to develop methods of self-service, or to replace men by women and adults by young workers.

Wagga Wagga, city of New S. Wales, Australia, on the Murrumbidgee R., approximately midway between Sydney and Melbourne, seat of a Rom. Catholic bishopric. It is the centre of a rich agric. and pastoral region. Pop. 19,640.

Wagner, Richard (1813-83), Ger. composer, dramatist, and essayist, b. Leipzig. He had an overture performed in 1830, but it was crude and badly received, and he then studied composition under Weinlig, cantor at the Thomasschule. In 1833 he became conductor of the opera at Magdeburg. By then he had already composed 2 operas, *Die Feen* (the Fairies) and *Das Liebesverbot* (Love's Interdict, based on *Measure for Measure*). In 1836 he married Minna Planer, an actress at Königsberg, where he had gone in search of employment. From Königsberg he went to Riga, where he was made musical director at the new theatre. In 1839 he went to Paris by way of London with his unfinished opera *Rienzi*, a remarkable achievement for so young a man, but showing the influence of Meyerbeer and Spontini. He lived in Paris in wretched poverty until 1842, when *Rienzi* was produced at Dresden, and he was appointed second conductor at the court opera there. *Rienzi* was followed by *Der fliegende Holländer* (The Flying Dutchman), which did not meet with the same approval, and 2 years later, in 1845, by *Tannhäuser*. In 1848 he finished *Lohengrin*; but in the following year, W., who had involved himself in the political agitation of the time, was forced to quit Saxony. He escaped to Zürich, where he remained till 1859. *Der Ring des Nibelungen*, 1853-74, his great tetralogy,

was begun at this time, but before he completed it he turned aside to write *Tristan und Isolde*, under the influence of Mathilde Wesendonk, with whom he fell deeply in love. A breach with Minna followed, and in 1861 a version of *Tannhäuser* made for the Paris Opéra had a disastrous reception. He received a pardon and returned to Germany. From the end of 1862 W. was in Vienna until 1864 when he was threatened with imprisonment for debt. He was then invited by Ludwig II of Bavaria to Munich, where *Tristan* was produced in 1865. W. fell in love with Hans von Bülow's wife Cosima (Liszt's



WAGNER

daughter), and the scandal was exploited by those of the Court who feared his influence on the young king. Obligated to leave Munich, W. went to Switzerland, where Cosima joined him in 1866. After her divorce in 1870 they were married. W.'s first wife having died in 1866. *The Meistersinger* was produced in Munich in 1868, and W. then continued work on the *Ring* cycle, abandoned many years before. In 1876 the entire *Ring* was performed at Bayreuth, in a building specially erected for the purpose. His last work, *Parsifal*, was a drama founded on the story of the Holy Grail. It was produced at Bayreuth in 1882, and W., exhausted by his work on it, went to Venice, where he d. from a heart attack.

W.'s influence permeates the period of the later 19th cent., affecting many of his contemporaries and successors. He prevailed by sheer force of will, regarding his new type of opera, the music drama, as the final art-form, to which music, poetry, and painting were all subservient; but his symphonic treatment and orchestration transcends the poetry. In the allegorical sequence (*Das Rheingold*, 1853-4, *Die Walküre*, 1854-6, *Siegfried*, begun in 1856, resumed, and completed in 1869,

Tristan und Isolde, 1857-9, *Die Meistersinger*, 1862-7, *Götterdämmerung*, 1869-74, and *Parsifal*, 1877-82) there is a final advance to the fully evolved music drama, in which the 'endless melody' still dominant in *Tristan*, becomes abbreviated into the 'leading motive' and the whole score is woven out of these motto themes.

His pub. writings and letters include *Schriften und Dichtungen* (10 vols.), 1871-83, 1911, *Die Kunst und die Revolution*, 1849, *Das Kunstwerk der Zukunft*, 1850, *Oper und Drama*, 1851, *Über das Dirigieren*, 1869, *Letters* (ed. by W. Altmann, 1905: Eng. trans. 1927; Selection trans. by M. M. Bozman, 1936). The W. bibliography is enormous. All biographies have been superseded by Ernest Newman's *The Life of Richard Wagner* (4 vols.), 1937-47. A shorter modern Eng. work, with a critical study, is by Robert Jacobs (*Master Musicians*, 1935).

Wagram, vil. near Vienna, Austria. Here was fought the battle of W. (July 1809), in which Napoleon, with the co-operation of his gens., Masséna, Davout, and Oudinot, defeated the Austrians under the Archduke Charles.

Wagtail, genus of insectivorous, passerine birds (*Motacilla*), related to the pipits. There are 3 species in Britain: the pied W. (*M. yarelli*), the grey W. (*M. cinerea*), and the yellow W. (*M. flava*). The white W. (*M. alba*), and the blue-headed W. (*M. flava*) are migrant. See S. Smith, *The Yellow Wagtail*, 1950.

Wahhabi, name given to the followers of Mohammad ibn Abd al-Wahhab (1703-87) by his enemies; they call themselves 'unitarians.' Within the Muslim creed they make these affirmations: God is the only object of worship; those who worship any other deserve death. Most men are not monotheists, as they employ saints to win His favour for them. It is polytheism to name a prophet, saint, or angel in the prayers, to employ mediators with God, or to make vows to another than Him. It is unbelief to accept knowledge which does not rest on the Koran, the example of the prophet, or strict proof, to deny the overruling power of God, to allegorise the Koran. They condemn all innovations, including tobacco, their mosques are plain, and they regard silk as no wear for a man. See ARABIA; SA'UD, I.R.N.

Wahlenbergia, a genus of ann. and perennial herbs, mostly S. African and of S. temperate countries, with a few tropical and N. temperate species; family Campanulaceae, about 150 species. *W. hederacea*, lvy Campanula, is a creeping perennial of W. Europe, including Britain; *W. capensis* is grown as a half-hardy annual in gardens, others under glass.

Walblingen, see GUELFIS and GHIBELINES.

Walhi, tn of N. Is., New Zealand, 32 m. from Thames and on the railway to Auckland. A former gold-mining area, it is surrounded by fertile dairying land. W. Beach is a popular holiday resort. Pop. 3056.

Waikato, riv. (200 m. long) of N. Is., New Zealand. Rising to the S. of Lake

Taupo, which it drains, it flows NNW. and finally W. to Port Waikato on the W. coast, where it enters the Pacific.

Wailing (or Western) Wall. Only 2 relics of the Temple of anc. Israel are extant: (1) the 'foundation stone,' also known as *es-Sakhra*, or the sacred rock, to-day covered by the Kubbet es-Sakhra, or 'Dome of the Rock,' and (2) the W. W., a portion of the wall which used formerly to surround the Temple, which was situated in the area of the present Haram esh-Sherif ('the Noble Sanctuary') in Jerusalem. The 9 lowest courses of the W. W. consist of huge blocks, as was characteristic of Herodian (Herod the Great, 37-4 bc) masonry, the largest one being 16½ ft long and 13 ft wide. Above are 15 courses of smaller stones. The W. W. reaches the height of c. 60 ft. It is named by the Jews the 'Kotel Ma'arabi' or 'Western Wall,' and only by Gentile onlookers has it been associated with 'wailing,' and that because the Jews recite there, along with other items of ritual, the Book of Lamentations in a loud voice. The Jews, indeed, assert that the W. W. is the most anc. and most sacred devotional shrine of the Jew, and that he possessed and worshipped at it cents. before Islam came into existence, thus giving him a prescriptive right of 19 cents. duration. The Muslims of to-day assert that the wall and its adjoining pavement are an integral part of the shrine which ranks next to Mecca and Medina in sanctity.

Wainfleet, tn in Lincs, England, on Steeping R., 5 m. from Skegness. It was the bp. of Wm of Waynesflete (1395-1486). Bishop of Winchester from 1447, founder of Magdalen College, Oxford, and of the Grammar School of W., built in 1459. Pop. 2500.

Waits were originally a band of watchmen who 'waited' or kept guard outside the dwellings of the great. Part of their duty was to 'pine the watch' musically at intervals, at the same time making sure that all was secure. From this derives the modern application of the term to street musicians who go about at the Christmas season playing carols for a gratuity.

Wakashan Language, see NORTH AMERICAN NATIVE LANGUAGES, *Pacific Areas*.

Wakatipu, lake of S. Island, New Zealand, in Ōtago (q.v.) prov. It is 25 m. long, 1242 ft deep, and 1016 ft above sea-level.

Wake (O.E. *waču*, a watch); or **Lyke-wake**, or **Lyeh-wake** (O.E. *lyc*, a body), anc. observance by which the body of a dead person was watched all night by friends and relatives. W.s. were also observed on the eves of saints' days, and became fairs, as in Lincs, and at Bradford (where they were known as tides). Ann. holidays are still called W.s in Lincs. The corpse W. survives in Ireland.

Wake-robin, another name for cuckoo-pint. See ARUM.

Wakefield, Charles Cheers Wakefield, first Viscount (1859-1941), businessman and philanthropist, educ. at Liverpool Institute. The organisation of C. C.

Wakefield and Co., producers of Castrol Oil, was founded by him in 1899, and from this he made a large fortune. He gave liberally to charity, and financed flights by J. A. Mollison, Amy Johnson, and Sir Alan Cobham. He also made generous donations to educational and cultural establs., guaranteeing £50,000 to the Brit. Museum for purchase of the Codex Sinaiticus, and presenting the Thomas à Becket cup and Nelson's log-book to the nation. W. was knighted in 1908, received a baronetcy in 1917, became a baron in 1930, and viscount 4 years later.

Wakefield, Edward Gibbon (1796-1862), Eng. colonial statesman, b. London, educ. at Westminster and Edinburgh High School. He served in the Brit. embassies at Turin (1814-16) and Paris (1820-6). When in Newgate Gaol, serving a term for abduction of his second wife, he wrote *The Letter from Sydney*, 1829, exposing the evil effects of 'transportation' and roughly sketched a system of colonisation. He formed a colonisation society in 1830, and the Bill to erect S. Australia into a Brit. Prov. followed as a result. The scheme failed, but in 1837 he turned his attention to the acquisition of New Zealand as a Brit. colony, first in face of much gov. opposition, but with its support when there was a threat of Fr. occupation.

There were flaws in W.'s theories, but fundamentally his ideas were sound, and the New Zealand settlements achieved prosperity more rapidly than any of their predecessors elsewhere. W. wrote *View of the Art of Colonisation*, 1849, and ed. *Smith's Wealth of Nations*. There is an ed. of some of his writings in Everyman's Library (1929). See lives by R. Garnett, 1898; H. J. Harrop, 1928; I. O'Connor, 1929.

Wakefield: 1. City, co. bor., and cap. of the W. Riding of Yorks, England, on the R. Calder, 9 m. SE. of Leeds. There are good rail and canal communications. A medieval tn of some importance, W. became a prominent centre for the cloth trade in the 16th cent. It became a municipal bor. in 1848, a city in 1888, and a co. bor. in 1914. It returns 1 member of Parliament.

Richard, Duke of York was defeated and killed by the Lancastrians at the battle of W. in 1460. In 1888 a diocese was created, the par. church of All Saints becoming a cathedral. The church is of the 15th-cent. Perpendicular style with a distinguishing crocketed spire (247 ft), the tallest in Yorks. On the old bridge over the Calder stands the chapel of St Mary, rebuilt in 1847 in a rich Decorated style. W. was the bp. of Dr Radcliffe and George Gissing. The grammar school is said to be the descendant of a 13th-cent. school: it was founded by a royal charter of Elizabeth I in 1591.

The industries of W. include worsted spinning, woollen manuf., shirt and blouse-making, wire-drawing, coal mining, and the manuf. of engineering and machine-tool products, chemicals, glass, and sheet metal. The administrative offices of the W. Riding co. council are

situated here. The prison at W. has become well known for its progressive policy. Pop. 60,000.

2. Tn of Middlesex co., E. Massachusetts, U.S.A. It manufs. shoes, dies, knitted goods, rattan chairs, and electrical products. It was originally part of Reading. Pop. 19,633.

Wakley, Thomas, see 'LANCET, THE.'

Walafridus Strabo (c. 807-849) (i.e. 'squinting Wilfred'), Ger. monk and scholar. Educ. at Reichenau, he entered the Benedictine order at 15. He was abbot of Reichenau from 838. His best-known work is *Visio Wettini*, c. 830, a poem that foreshadowed Dante's work. See K. Beyerle, *Die Kultur der Abtei Reichenau*, 1925-6.

Walbrook, thoroughfare in the city of London, named from the riv. that once flowed into the Thames at this point, just W. of Cannon Street Station. The name means 'the stream of the Britons.' Just beyond its E. bank was the site chosen by the Romans for fortification in the Claudian invasion (AD 43), and is probably the first area of Rom. settlement in London. Many Rom. remains have been found on the site, culminating in the discovery of a mithraeum in 1953. The church of St Stephen W., generally considered as containing Wren's finest interior, has been restored after destruction in the Second World War.

Wałbrzych (Ger. Waldenburg), tn of Poland, in Wrocław prov., in the foothills of the Sudetic Mts (q.v.), 43 m. SW. of Wrocław (q.v.). It was formerly in Poland Silesia, and is a coal-mining centre. Pop. 82,000.

Walburga, see WALFURGA, ST.

Walcheren, is. in the prov. of Zeeland, Netherlands, lying between the E. and W. Scheldt. The fertile land is protected from the sea by dikes. The chief tns are Middelburg and Flushing.

In Oct. 1944 Antwerp was in Brit. hands, but Germans on Walcheren controlled the mouth of the Scheldt. The R.A.F. breached the dikes by bombing and almost completely flooded W. On 1 Nov. commandos and part of 52 Div. landed on the is. and cleared it by the 10th. The last part of the dike-breach was closed in Feb. 1946, and in the same year a harvest was reaped from the reclaimed land.

Wałoz (Deutsch-Krone), tn of Poland, in Koszalin prov., 65 m. S. of Koszalin (q.v.). Until 1945 it was in Pomerania (q.v.). It is an important road and rail centre, and has a trade in live-stock, and textile manufs. Pop. 8000.

Waldeck, former principality of W. Germany, merged in the prov. of Hesse-Nassau (q.v.) in 1928. The cos. of W. and Pyrmont were united in the 17th cent., and the counts were created princes at the beginning of the 18th cent. In 1867 the principality passed to Prussia (q.v.), and in 1922 Pyrmont became part of Hanover prov. in Prussia. The cap. was Arnsen (q.v.). Area 433 sq. m.

Waldeck, or **Waldeck-Pyrmont**, former principality of Germany consisting of W. enclosed by the Prussian provs. of West-

phalia and Hesse-Nassau, and Pymont surrounded by Hanover, Lippe-Detmold, and Brunswick (qq.v.). In 1919 W. became a state of the Ger. Rep. with a separate constitution. In 1929, however, it was merged into Prussia (q.v.).

Waldemar (kings of Denmark), *see* WALDEMAR.

Walden, Paul, *see* WALDEN INVERSION.

Walden inversion, discovered in 1895 by the Russian chemist, P. Walden, refers to the change in sign of optical activity occasionally observed when an optically active compound is converted into its enantiomorph without the separation of a racemate. For example, *l*-chlorosuccinic acid on treatment with moist silver oxide gives *l*-malic acid, and this on treatment with phosphorus pentachloride yields *d*-chlorosuccinic acid. By a large amount of research work, the mechanism of the W. I. has been elucidated. *See* STEREOCHEMISTRY.

Waldenburg, *see* WALBRZYCH.

Waldenses, or **Vaudois**, religious body initiated about 1176 by a rich merchant of Lyons, Peter Walde. At first a movement for voluntary poverty, it gradually developed unorthodox doctrines, some borrowed from the Cathari. Spreading through Provence, Lombardy, and N. Spain, the W. were subjected to intermittent persecution for cents. *See* K. Algermissen, *Konfessionskunde* (5th ed.), 1939; Daniel-Rops, *Cathedral and Crusade* (trns.), 1937.

Waldmann, Hans, burgomaster of Zürich, 1483-89. *See* ZÜRICH.

Waldorf, William, *see* ASTOR, FIRST VISCOUNT.

Waldron, George, *see* BARRINGTON, G.

Waldteufel, Emile (1837-1915), Alsatian composer, *b.* Strasbourg. He became court pianist in Paris, and achieved great popularity by his waltzes.

Wales (Welsh, *Cymru*), anct principally forming a great westerly promontory (area 7470 sq. m., excluding Monmouth) of continental Britain, jutting out into the Irish Sea. W. is bounded on the E. by (N. to S.) the Eng. cos. of Cheshire, Shropshire, Hereford, and Monmouth (often included with W. for statistical purposes). On the N. and W. lies the Irish Sea, and on the S. the Bristol Channel and the Severn estuary separate W. from the SW. peninsula of England. The is. of Anglesey (q.v.) is divided from the NW. coast by the Menai Strait (q.v.). Cardiff is recognised as the cap.

Administrative Divisions. W. is divided into 12 geographical cos.: Anglesey, Brecon (or Brecknock), Caernarvon, Cardigan, Carmarthen, Denbigh, Flint, Glamorgan, Merioneth, Montgomery, Pembroke, and Radnor (qq.v.).

Topography. Practically the whole of W. is within the Highland Zone of Britain; the Cambrian Mts. lying NE.-SW., occupy most of the country (*see* EUROPE, *Geology*). The highest mts are those of the Snowdon (q.v.) range in the NW. (Caernarvonshire), and Snowdon (3560 ft) is the highest mt in England and W. To the S. of this range are Cader Idris and the Arenig group (in Merioneth), and to

the E. of these mts are the Berwyn Mts (on the S. Denbighshire-Montgomeryshire border); between the vale of Clwyd and the estuary of the R. Dee lies the Clwydian Range (NE. Wales). In central W. the hills tend to be rounder and more undulating between the upper reaches of the Severn and the Usk; in the S. the Black Mts and the Brecon Beacons (qq.v.), with the Black Mts of Carmarthen (on the Carmarthen-Brecon border), form an E.-W. boundary between centre and S. Anglesey and the N. coastal plain, including the low-lying Lleyn Promontory, together with a narrow strip of lowland along the shore of Cardigan Bay, most of the co. of Pembroke, S. Carmarthenshire, the Gower Peninsula, and the Vale of Glamorgan (lying between Cardiff and Port Talbot) make up the Welsh Lowland Zone. The prin. rivs. are the Wye, Usk, Taff, Neath, and Tawe; Vyrnwy and Bala (qq.v.) are the 2 largest lakes. Shelter provided by estuaries of numerous small rivs. has led to the estab. of many little ports on the Welsh seaboard; Cardigan Bay (q.v.) is the largest bay in Wales.

Climate. The climate of W. is generally inclined to be wetter than that of England, owing to the mountainous nature of the terrain; the mild climate of N. Wales has led to the growth of a number of coastal resorts. For ann. average daily mean air temperature, rainfall, etc., *see* ENGLAND (CLIMATE); *see also* EUROPE (CLIMATE).

Rural and Urban Wales. The valleys of central W., with the western plateau region (Cardigan and part of Carmarthen), are largely suitable only for pasture, and sheep-farming and stock-raising are the prin. occupations. This area is sparsely populated, and includes a tract of moorland (Mynydd Epynt) in N. Brecon. A substantial acreage in the central area forms a water-gathering ground for the Birmingham Corporation, and afforestation schemes are planned for this part of W. N. Wales, with its impressive and beautiful scenery, attracts many tourists, particularly to the Snowdonia National Park and to the coastal resorts, though here also there are no large urb. centres. In the S., however, are the 3 Welsh co. bors (Cardiff, Swansea, and Merthyr Tydfil, qq.v.), and in the area of the S. Wales coalfield (*see below*, *Industry*) is concentrated nearly half the total Welsh pop. Here, too, are the major Welsh ports, Cardiff, Barry, Swansea, Port Talbot, Penarth, Llanelly (qq.v.); Milford Haven and Fishguard (qq.v.), the latter with Holyhead in N. Wales having steamship services to Ireland, lie farther W. of the main group (*see* GREAT BRITAIN, *Communications*). The co. of Pembroke forms a low-lying peninsula in the SW.; it includes the Pembrokeshire National Park, some 150 m. of coast.

Population. The total estimated pop. of W. with Monmouth (to the nearest thousand) at mid-1955 was 2,603,000 (for further details, *see* ENGLAND (POPULATION)). At the same period, 1,819,000 people were estimated as living in urb. areas, while the remaining 784,000 lived

in the rural dists. Glamorgan had the highest and Radnor the lowest pop. density of the Welsh cos.

Employment. The total number of employees in W. at mid-1955 was estimated as in the region of 946,000. The 4 prin. occupations are indicated in the following table:

Mining and quarrying	133,800
(includes coal mining 124,200; stone quarrying and mining 4600; slate quarrying and mining 3600)	
Distributive trades	87,400
Transport and communications	86,000
Metal manufacture	83,400
(includes iron and steel melt- ing, rolling, etc., 33,900)	

(Figures to the nearest thousand)

Agriculture, forestry, and fishing accounted for only 30,800 persons. There is an unemployment problem in the prov. of Gwynedd (comprising 3 cos. of NW. Wales: Anglesey, Caernarvon, and Merioneth), where the slate industry, of great importance before 1900, has gradually dwindled away (see figures under *Mining and quarrying* in the above table) and, often as a consequence, the small ports of the area have also declined, in spite of efforts to introduce new industries (tourism, oil imports, extraction of bromine from sea-water, etc.). In S. Wales trade at the prin. S. Wales ports has shown some signs of decline, though efforts are being made, by modernisation and electrification schemes, to attract new trade. Similar problems affect Llanelli (q.v.) (see also MILFORD HAVEN).

Industry. In the S. Wales coalfield, which stretches from the Monmouth-Glamorgan border to E. Cardigan, anthracite, steam coal, and bituminous coal are found; iron ore was formerly mined on the N. edge of the field, but is now mostly imported to this area; tin is also imported for the great tinplate industry carried on here and in Monmouthshire. There is another smaller coalfield in NE. Wales, centred on Wrexham; in NW. Wales some stone and slate are quarried. Formerly some gold was mined. Some hydro-electricity is generated in Snowdonia. In the valleys of Glamorgan are the industrial tns, often crowded together; tinplate and steel are manuf. around Port Talbot, Llanelli, Cardiff, Swansea, and two-thirds of all Brit. tinplate and one-third of Britain's sheet steel are produced in the great works in and around Margam, where the biggest steel works in Europe is situated. Rhondda, Ebbw Vale, Merthyr Tydfil, Aberdare, Tredegar, and Pontypridd are among the prin. industrial centres. Goods from this area pass through the S. Wales ports; Cardiff (with Barry Dock) and Swansea distribute most of the steel, and Swansea imports and exports oil for nearby refineries (Llandarcy is the prin. centre). Milford Haven (q.v.) is now being developed as a major oil port. In 1958 a controversial proposal was put forward by the gov. to build a nuclear

power station on the shore of Lake Trawsfynydd in the Snowdonia National Park with output capacity of 500,000 kW.

Historical Monuments and Places of Interest. (In such an article this subject can be covered in only the briefest terms. A list of Welsh monuments protected by the State can be found in the *List of Ancient Monuments in England and Wales* (H.M.S.O.), 1955.) W. has many examples of burial mounds and megalithic monuments, particularly in Pembrokeshire, which is also rich in pre-Rom. camps and sites of early settlements. The great Offa's Dyke (q.v.) is the longest example of a linear earthwork in Britain, and considerable stretches of it may still be seen in the Welsh Marches. At Caerleon and Caerwent (q.v.) in Monmouthshire are notable Rom. remains, and there are a number of other Rom. sites in W. proper, including those at Caernarvon, and at Y Gaer, near Brecon. Secular buildings include many castles, among the finest being Powis Castle, Montgomeryshire; N. Wales is particularly rich in castles, among them those at Conway, Caernarvon, and Harlech (qq.v.). The cathedral at St David's (q.v.) amply repays a visit, and there are a number of small and beautiful churches scattered throughout the principality; Llananno has a remarkable rood loft and screen, and the Transitional-Norman ruins of Llanthony Abbey, in the Black Mts, though in a different category from the former, are most impressive.

Wild Life. The majority of the wild animals cited in the article England (see ENGLAND (WILD LIFE, Fauna)) are also found in W. The latter country, however, is one of the last homes of the polecat (now believed to be extinct in its former habitats, the Lake Dist. and Scotland); and kites, now rarely seen elsewhere, are to be observed in the Black Mts. The Atlantic grey seal can be seen in the seas off SW. Wales (and also off the Cornish coast on the opposite side of the Bristol Channel). The small is. around the Welsh coasts, particularly those off Pembrokeshire (see GRASSHOLM; SKOKHOLM) and off Anglesey, are favourite nesting-places for sea-birds, particularly the gannet and puffin.

Like the plants of England (see ENGLAND (WILD LIFE, Flora)), those of W. must be regarded as part of the common European flora, and most plants found in England are common also to W. In Snowdonia, however, there are a number of beautiful wild plants not found elsewhere in Britain, among them certain saxifrages and primulas.

History. Throughout its early hist., as in later periods, the human settlement of W. has been dictated by the geographical personality of the countryside. It is part of the Highland Zone of Britain, a land chiefly of mt and high plateau which consists of Palaeozoic rocks; its connections with the E. parts of Britain facing the Continent are less than with Ireland, and the famous W. sea-route which brought the Mediterranean into touch with Scandinavia. Native cultures per-

sisted for many cents. after they had been replaced in Lowland Britain. An outstanding example is the round hut circles of the Bronze Age in N. Wales, which were absorbed into the cultures of the Early Iron Age and continued in use well into Romano-Brit. times. Caves, also, which were used by prehistoric man were the homes of Romano-Brit. people. At the same time, the prehistoric settlement of W. was also governed by the height of the human habitation line on the mt. sides, and by the presence of coastal plains in the S. and SW.

The Lower Palaeolithic is not represented in W., probably because of the lack

for the making of axes of igneous rock near Penmaen-mawr, Caernarvonshire. Its products were widely traded. Settlement of W. in the Bronze Age came from the Cotswold-Somerset area to the S. coastal plain, and from Ireland.

So rapid was the domination of lowland Britain that within 4 years the Rom. Army was estab. on the frontier of S. Wales, and by about 75, the Second Legion was estab. in its fortress at Caerleon (*Ica Silurum*) in Monmouthshire. This fortress and its adjuncts have been carefully excavated, and its place in the story of Rom. W. is now well known. With the legionary fortress at Chester, it



HARLECH CASTLE, ON THE WEST COAST OF WALES

P. S. Ram

of animals or food in this difficult countryside, and because there was no stone suitable for the large core and flake tools of the earlier periods. Later stages are known in the caves of N. Wales in the Vale of Clwyd, and particularly in Gower, where, in Paviland Cave, Dean Buckland discovered the oldest human burial yet known in Britain. The food-gathering economy of the Mesolithic is represented in N. Wales, particularly at Prestatyn, Flintshire, and elsewhere in coastal dists. which provided sea-fishing and beach pebbles for conversion into tools.

W. is rich in remains of chambered tombs, cairns, and other megalithic monuments. There are many examples of stone circles. From detailed study, archaeologists have been able to recognise a distinctive megalithic culture centred round the Severn. An outstanding feature of the Neolithic period was a factory

became a base of military occupation by troops stationed in auxiliary forts. There was a considerable rebuilding of forts in stone in the 2nd cent., but about 120, much of the Welsh police garrison was withdrawn by Hadrian for employment on the rebuilding of the Wall. At Cardiff was estab. one of the forts of the Saxon Shore, designed for defence against sea rovers. Apart from the areas of military occupation, native life was not much influenced by the Romanisation felt elsewhere. See W. F. Grimes, *The Prehistory of Wales*, 1951 ed.; R. E. M. Wheeler, *Prehistoric and Roman Wales*, 1925; the former with a good bibliography.

The Celts accepted Christianity in about AD 200, and they maintained this faith when the rest of the is. was re-paganised. On the conquest of Britain by the Saxons (c. 450-600) the Celts were driven back

into the W. corners of the Is., Cumberland, W., and Cornwall. Henceforth W. became the main stronghold of the Celts or Britons. Powerful native princes arose in W., and extended and consolidated their dominions. Among the most notable of these were Cadwallon the Long-Handed and his son Maelgwn Gwynedd. The Welsh people were for a time united under the latter's grandson, also named Cadwallon. The Britons of W. for some cents. made repeated attempts to recover the N. parts of England from the Saxons, but their defeat by Ethelfrith, of Northumbria, the Angle king, at the battle of Chester (c. 613), severed Strathclyde and all N. Britain from W. Cadwallon made one great attempt to recover the N. and to win the crown of Britain, but died fighting for it in 635, leaving to his son, Cadwaladr, a distracted and plague-stricken country. This ill-fated Cymric attempt to continue the political unity bequeathed by Rome to the W. found expression in the Arthurian romances and these gradually dominate Welsh political thought. This same period was one in which monasticism made great progress in the country and also gave W. a patron saint, St David, who represents the final victory of Christianity over a host of pagan deities.

After the death of Cadwaladr, king of Gwynedd, in 664, the struggle for the recovery of the N. of Britain was abandoned for ever. For the next 600 years the struggle was between a king who regarded himself as the champion of the Britons, wearing 'the crown of Arthur,' and the princes who were descended from the tribal princes. For this period the chief source of information is the *Chronicle of the Princes* written about the first half of the 14th cent., probably at the Cistercian abbey of Strata Florida in Ceredigion (Cardigan). Then came a period of internal strife and Saxon aggression, W. being apportioned among its many petty princes. The country was once again united under Rhodri the Great (844-78), who successfully resisted the onslaughts of the Danes, but was himself defeated and slain by the Mercians. On his death his dominions were again divided among his 3 sons, Anarawd, Mervyn, and Cadell. The next important Welsh prince was Howel Dda or Howel the Good (c. 909-49), who made himself master of the greater part of W., but did homage to King Athelstan of England. He also collected and codified an elaborate system of laws by which the people were divided into the royal class, the free tribesmen, and the non-tribesmen. From 950 to 1010 no supreme king ruled in W., but there were constant struggles between various petty local princes, as well as many raids on the part of Danes and Saxons. This period of anarchy was followed by the rule of 2 strong princes, Llewelyn ap Seisyllt and his son Griffith (Gruffydd). Llewelyn did much to reunite his country, which he completely freed from Dan. raids. Griffith (1039-63) was a monarch of great energy. He expelled the Saxons from Gwynedd, con-

quered S. Wales, consolidated his dominions, and made war against England. Eventually Harold of England subdued S. Wales and defeated Griffith (1063).

The Norman conquest of England (1066) had at first little immediate effect upon W. But it was not long before the Norman kings began to make encroachments, in particular placing on the Welsh borders a number of powerful barons who took advantage of the disorganised state of W. to expand their territory. The next 2 cents. (roughly, 1066-1282) form an epoch of continual struggle against Norman aggression. In 1094 there was a brief and transient Welsh revival, led by Cadwgan ap Bleddyn, who united the Welsh people against the Normans. At length Henry I made a determined effort to anglicise W., which he attacked simultaneously with 3 armies, reducing most of the Welsh princes to submission. They recovered much of their lost ground, however, during the civil wars of Stephen's reign.

During almost the whole of Stephen's reign and a great part of that of Henry II, the dominant figure in W. was Owen Gruffydd (who reigned from 1137 to 1169) son of Gruffydd ap Cynan. Between his death and the ascendancy of Llewelyn the Great, Davydd, Owen's son, tried to maintain some show of supremacy over the chiefs of Gwynedd, but in the last quarter of the 12th cent., when Henry II was endeavouring to curb the power of the border barons and at the same time to subjugate the Welsh princes, the chief figure in Welsh hist. is not Davydd I, Lord of Snowdon, but Rhys ap Griffith, Lord of the Vale of Towyn and son of Griffith ap Rhys (d. 1137). Rhys ap Griffith had defied both Owen Gwynedd and Henry II, but when Henry invaded W. in 1157 he made common cause with Owen, and Henry's army had to retreat. It was the rise of a new power in Ireland in the time of Strongbow that lessened the pressure on Rhys and thereby conduced to peace between him and the king. It was indeed largely through the co-operation of Rhys ap Griffith (1132-97), now his ally and vassal, that Henry succeeded in establishing some semblance of order in W., and he recognised this fact by making him Justiciar of S. Wales.

Meanwhile, before the end of the 12th cent., the Welsh Church had been merged completely in the Eng. Church and had thus lost all independence in internal affairs. A formidable stand was made for independence in eccles. matters by Giraldu Cambrensis (q.v.), but without ultimate success.

The most significant figure in medieval Welsh hist. was Llewelyn ap Iorwerth (the Great), who reigned from c. 1196 to 1240. In daring generalship he was the equal of Cadwaladr, and in cautious statesmanship not inferior to Owen Gwynedd. For nearly half a cent. W. in his lifetime was spared the frequent reaction against centralisation which generally ensued on the close of the rule of a strong prince. He was a powerful force on the side of the barons in their

struggle with King John, and in fact some 3 clauses of Magna Carta declare his privileges and recognise the independence of the law administered by him. At first, Llewelyn encountered difficulties from the jealousies of members of his family, but he overcame most of these difficulties through his alliance with John, reinforcing his alliance by his marriage with Joan, a daughter of the Eng. king. Llewelyn, however, was shrewd enough to realise that England was ultimately invincible, and at the end of his life he tried to secure for W. the continuation of peace by placing the country in feudal dependence on the King of England, by a treaty made through the Bishops of Chester and Hereford. By this treaty he gave away the semblance of Welsh independence while retaining the reality of it, but this involved the succession of Davydd, his son by an Eng. mother and the cousin of the king, and the disinheriting of Griffith, b. of a Welsh mother. Griffith was able and forceful, whereas Davydd was not, and the sympathies of many in W. were with Griffith and with his policy of hostile independence of England. Llewelyn could not reconcile his sons; he retired to the Cistercian monastery at Aberconway, where he d. (1240).

On Davydd's death in 1246 there were 4 claimants to the Welsh crown; Owen and Llewelyn, the sons of Griffith; Ralph Mortimer, who had married Gladys, daughter of Llewelyn the Great, and who at his death left his estates and claim to his son, Roger; and Edward, the king's son, later to become Edward I.

A settlement was reached in 1267 when Henry and Llewelyn met at Montgomery and there was ratified the treaty which gave W. peace under the recognised rule of Llewelyn. On the death of Henry (1272) Llewelyn refused to take the oath of fealty or to do homage to Edward, who at that time was absent on the Crusades. After his return to England, Edward, in 1275, appeared with an army at Chester. The following year Edward made great preparations for a war of annihilation against Llewelyn and in 1277 his army closed round W. Llewelyn realised the hopelessness of continuing the struggle and submitted to the humiliating terms of the treaty of Rhuddlan (10 Nov. 1277). He did homage to Edward at Westminster in 1278, but a few years later again broke out into revolt. Edward once again invaded W. and overran the country. Finally Llewelyn was killed in a chance encounter (1282).

From this date W. ceased to have any separate political existence. The conquest of the country brought into the king's hands the gov. of the principality and of those chieftains in S. Wales who had become Llewelyn's adherents. In all these lands gov. by princes was replaced by that of the king's officials. Llewelyn's principality became 6 shires: Anglesey (the former is. of Mon), Carnarvon, Merioneth, Flint, Cardigan, Carmarthen. Snowdon was surrounded by new castles. The young prince Edward, born

at Carnarvon, was the new Prince of Wales, and to him was given the honour of offering Llewelyn's coronet at the shrine of Edward the Confessor at Westminster.

Throughout Edward II's reign a struggle went on between the new official class and the conquered people. Edward, however, was popular with the Welsh, for he regarded himself as a Welshman. His ordinances were just, and he summoned Welshmen to Parliament. Edward might have retained the affection of his Welsh subjects, but he alienated their sympathy by favouritism.

The period which followed from 1350 to 1400 was one of disintegration, due mainly to the tyrannies and exactions of the great marcher barons. The most formidable rising in W. against the new order and the tyranny of the border barons was the great national movement associated with the name of Owen Glendower (fl. 1400-15). By fighting in his own private quarrel, he became the leader of the widespread revolt which terrified all in authority at the time and left behind it a more enduring impression on Welsh legends than any other political or social movement. In 1404 Glendower was supreme in W., holding his own Parliament; his political ideals being an independent W., under prince and Parliament, an independent Church, with St David's as its metropolitan see, and the organisation of the new learning through Welsh univs. All his political ideals vanished with his death, save a vague sense of nationality.

The prin. results of these risings and of the havoc wrought by the wars of the Roses were the destruction of the feudal system, the prevalence of robbers, the appropriation by Englishmen of all positions of trust, the enactment of many severe and unjust laws against the Welsh, and the consequent growth of bitter racial feeling. The border barons continued to make unjust exactions, and the rights of citizenship were withheld from the Welsh people. Nevertheless, this period of oppression corresponds in point of time with the golden age of Welsh poetry.

The chief movements in Tudor times in W. were the political reorganisation, the reform of the system of justice, and the religious reformation, to the last of which there was passive resistance. The political reorganisation was the work of Thomas Cromwell. The Act of Union of 1535 united W. to England, and by its operation the former was politically assimilated in all respects to the latter. The liberties as well as the laws of England were extended to the Principality, and W. was now for the first time given parl. representation. On the other hand, the Welsh language was completely banished from the courts, and many old Welsh customs were abolished. One great benefit of the Act was the conversion of the marcher lordships into shire ground, the new shires being Brecknock, Denbigh, Monmouth, Montgomery, and Radnor, while the shires of Glamorgan, Pembroke, Carmarthen, Cardigan, and Merioneth were enlarged.

Religion in Wales. In matters of religion W. was not at first very greatly affected by the Reformation, but during the 17th cent. the Baptist movement was estab. in W., and at the beginning of the Methodist revival, about 1730, the country experienced a great religious awakening. The religious revival led indirectly to a great though gradual national awakening, which has since borne diverse and abundant fruit in a social, literary, and industrial revival. See CALVINISTIC METHODIST CHURCH OF WALES; DISESTABLISHMENT; WALES, CHURCH IN. The Rom. Catholic prov. of W. is composed of the archbishopric of Cardiff and the bishopric of Menevia.

Education. See EDUCATION, *England and Wales*. The univ. of W. estab. in 1893, now has 4 centres, in the form of constituent colleges, at Aberystwyth, Bangor, Cardiff, and Swansea, while tutorial classes are conducted throughout the country under the aegis of the univ. (see WALES, UNIVERSITY OF). A notable acquisition in public buildings is the celebrated National Museum of W. (Amgueddfa Cenedlaethol Cymru) at Cardiff, opened by George V in 1927.

Welsh Nationalism has been effective in the cultural sphere through such institutions as the *Eisteddfod* (q.v.) and the univ. of W., by the use of the Welsh language and by the estab. of a separate Welsh broadcasting region, but politically has found little solid support. The Nationalist demand for a separate Welsh Parl. is not supported by either the Conservative or Labour parties officially, though it has support from individual party members. The gov. in 1948 rejected the scheme of a separate ministry for W., and an Advisory Council, of somewhat ill-defined functions, was estab. when the Conservatives returned to power in 1951; they created a Ministry for Welsh Affairs, but until 1957 this office had always been combined with another under the same man. The first holder was Sir David Maxwell Fyfe, later Lord Kilmuir (q.v.), who combined it with the Home Secretaryship, 1951-4; he was succeeded by Gwilym Lloyd George, later first Viscount Tenby (q.v.), who held the two posts 1954-7. Subsequently Henry Brooke, Minister of Housing, also held the post of Minister for Welsh Affairs. In Dec. 1957, however, a separate Minister of State for Welsh Affairs was appointed; the first minister was Mr David Penrose Lewis, who was raised to the peerage as Baron Brecon. A Welsh Nationalist party, aiming at a separate Welsh Parliament, exists (see PLAID CYMRU). The movement *Urdd Gobaith Cymru* (League of Youth) is non-political in character and was founded by Sir Ifan ap Owen Edwards, to protect the Welsh language.

The Arts. The arts of W. are the arts of poetry and song. Artists from W., however, have at times played notable parts in the development of Brit. art. Among painters, the most prominent is Richard Wilson, whose achievement it was to graft the Eng. landscape school on to that of the Continent, and whose

influence was a decisive factor in the development of the former. Mention must also be made of the engravers Robert Walker and John Jones, and the sculptor John Gibson. 20th-cent. artists include J. D. Innes, Augustus John, Sir Frank Brangwyn, David Jones, and Sir Wm Goscombe-John.

In the field of applied arts it is noteworthy that the remoteness of W. has fostered, and until recently preserved, native traditions in craftsmanship. In the peasant arts of the builder, weaver, wood-turner, and quilter, widespread European conceptions receive an individual national expression. The Welsh tradition in wrought ironwork attained its finest flowering with Robert and John Davies in the 18th cent.; but that the arts of metalwork also fl. in W. in a far earlier age may be inferred from the splendid examples which she has furnished of the La Tène art of the early Iron Age. Lastly mention must be made of the japanned tinware made at Pontypool and Usk in the 18th and early 19th cents., and the brilliant pottery and porcelain made at Swansea and Nantgarw early in the 19th cent.

Welsh Language and Literature. Welsh or *Cymric* (together with Breton and Cornish) belongs to the Brythonic subdivision of the Celtic branch (Gaelic, i.e. Irish and Scottish and Manx form the Goidelic subdivision), of the Indo-European languages (q.v.). The language is phonetically written, and the accent is generally on the penultimate syllable. The Welsh alphabet contains 28 letters or combinations of letters (*ch, dd, ff, ng, ll, ph, rh, th*). The earlier Welsh verse-material contains 6th-cent. elements, but the earliest glosses and preserved poems are attributed to the 9th-11th cents. From the 12th cent. onwards there has been produced a vast amount of Welsh literature, which is still preserved. Up to the Tudor period Welsh was spoken by the upper and the lower classes. Two causes have kept the Welsh language alive up to the present day: the isolation of the people among the mountains, and religion. The Snowdonian region (*Eryri*) was never conquered by England, nor has there been any incentive for any other people save the Welsh to take possession of the Caernarvonshire mountains. The Welsh language, however, might have died soon, but for the efforts of men like John Penri, who in Elizabeth's reign gave his life for his language, with the result that the Bible was trans. into Welsh in 1588. That saved the native tongue for some generations. The Methodist revival of Welsh in the 18th cent. gave birth to an educational system, the development of which is not even yet completed. Schools sprang up in the wake of the preachers. The Bible was sold for a few pence, and the language was saved. Now Welsh is taught in the primary and secondary schools, a number of all-Welsh primary schools have been estab., and Welsh is studied at the Welsh Univ. colleges. The pub. of the first part of Prof. J. M. Jones's *Welsh Grammar* in June 1913 was

a notable event in the progress of the new national spirit of W. The desire of the modern scholars was to bring uniformity into the spelling, to reintroduce some of the vocabulary of medieval Welsh, to abolish the Latinisms introduced by the scholarly translators of the Bible, and to revert to the standard of pure Welsh prose as it was written by Ellis Wyn in his *Bardd Cwsc* of 1704. In the 19th cent. the *Elsteddod* (q.v.) became an annual event, and there can be no doubt of its influence in keeping alive in the Welsh people a keen appreciation and understanding of their language.

The earliest period of Welsh literature is that of the *Cynfeirdd* or early poets. Much of their work is anonymous, but the major part is associated with the names of Aneurin (q.v.) and Taliesin (q.v.), poets of the late 6th cent. and Llywarch Hen, a dramatic figure in a 9th-cent. saga. This poetry survives in the 'Four Ancient Books of W.': the Black Book of Carmarthen, the manuscript of which belongs to the 12th cent., the Book of Aneurin and the Book of Taliesin (13th cent.), and the Red Book of Hergest (see under *MABINOGION*) (late 14th cent.). (See also *TRIAD*.) Aneurin is the reputed author of the *Gododdin*, a lyrical epic of battle. Besides heroic and saga poetry a fair amount of nature and gnomic verse was composed by the later *Cynfeirdd*. The next period is that of the *Gogynfeirdd* or the medieval poets, the court poets of the Norman period, chief among whom were Gwalchmai and Prince Hywel ab Owain. This was the period of the bardic schools which elaborated the rules of versification that have now become traditional in Welsh poetry. Later documents associate the name of Gruffudd ap Cynan, who returned from Ireland in 1080, with a reorganisation of the bardic order, but it is difficult to ascertain the exact nature of that reorganisation. The highest reputation among the bards belonged to Cynddelw, 'the great poet.' It was during this period that written form was first given to the 11 great romances, known as the *Mabinogion* (q.v.). The next or third period is dominated by the genius of Dafydd ap Gwilym (q.v.) (fl. 1340-70), who wrote in a simpler style than the bardic poets and developed a new form of metre in his *cynryddau* or lyrical odes. The first *Elsteddod* was held in the 15th cent. although tradition places similar events at a much earlier date. The metre of the bardic poetry and of the *cynryddau* was strictly unaccentual. The anglicisation of Welsh culture in the 16th and 17th cents. led to the introduction of accentual or so-called 'free' metres, brought to considerable perfection by Richard Hughes, who was at the court of Queen Elizabeth, and later by Huw Morus (1622-1709), who was the greatest figure in Welsh literature in his day. During the course of a long life he wrote political and satirical verse as well as love-poems and religious songs. He was a Royalist, and opposed to him in politics was his contemporary, Morgan Llwyd (1619-59), who also wrote political verse in the free

metres. He is chiefly remembered, however, for his prose writings, strongly influenced by Boehme. Apart from the work of these poets, Welsh poetry was in decline, flourishing only in popular ballads or folk-songs and in religious verse. One writer of hymns was Elis Wyn (1671-1734), whose fame, however, is more secure as a master of Welsh prose. His great prose work *Gwledigaethu y Bardd Cwsc* (*Visions of the Sleeping Bard*) was pub. in 1704, and although borrowed through English from the Spanish of Quevedo, it is so native in its colour, speech, and idiom that it is set to-day as a model for all generations to copy. The religious movement was the chief, but not the only influence in the revival of Welsh literature in the 18th cent. There was at the same time a growing antiquarian interest, to which the present-day Welsh society of the Cymmrodorion owes its origin. The Gorsedd or Court of the Poets also came into existence with its arch-druid as president, its druids, bards, and oviates. The return to the traditional literature found its chief exponent in Goronwy Owen (d. 1769). His greatest poem was his ode *To the Judgment Day* (*Cywydd y Farn Fawr*). Greater popularity, however, was won by the dramatic interludes written by Thomas Edwards (1739-1810), whose bardic name was Twm o'r Nant. These poets wrote mainly in the 'strict' traditional metres. The 'free' verse, however, reached a new perfection in the work of Alun (John Blackwell, 1797-1840). After him came the 2 outstanding poets of the 19th cent., Ceiriog and Islwyn, the bardic names of John Ceiriog Hughes (1832-87), and William Thomas (1832-78) respectively. Ceiriog wrote lyric poetry derived from peasant life. By contrast, Islwyn was a mystical writer with little lyric feeling. These 2 poets were at the head of a renaissance of Welsh literature, to which a further impetus was given in the 20th cent. through the research and scholarship and above all by the poetic example of Sir John Morris-Jones (1864-1929), who was Prof. of Welsh at Bangor Univ. Among his followers in what has come to be known as the Bangor school of poetry are numbered 2 of the foremost writers of the present cent.: Thomas Gwynn Jones (1872-1949), and W. J. Gruffydd (1881-1954). A high degree of literary accomplishment distinguished Gwynn Jones, whose Arthurian poem won the chair in the *Elsteddod* of 1902. He wrote in both the strict and free metres, being particularly successful in the former. Other major poets associated with the Bangor school are R. Williams Parry, who, like Gruffydd, represented a neo-paganism, and T. H. Parry-Williams, a more austere and introspective poet. An older contemporary, less modernistic in his approach, as is shown by his preference for a bardic name, was Elfed (Rev. H. Elvet Lewis, 1860-1953). He and other poets of the time from S. Wales were less intellectual and scholarly than the 'new poets' of the Bangor school, but they wrote simply and in the traditional

manner, moving poems descriptive of Welsh communal life. Elfed and Elifon Wyn (E. H. Williams, 1867-1926) were in fact judged the most popular of Welsh poets of this century. Among the poets whose reputation belong chiefly to the First World War, are Cynan (Rev. A. E. Jones), Hedd Wyn (Ellis Evans, 1887-1917), and T. E. Nicholas. Mention must be made of other poets whose work showed that Welsh poetry was a living force and by no means an academic exercise in a forgotten idiom. They include E. Prosser Rhys, who in collaboration with J. T. Jones won the crown at the Eisteddfod in 1924, also Caradoc Prichard, whose poems were also crowned, Iorwerth C. Peate, Wil Ifan (Wm Evans), W. R. Hughes, Gwennall Jones, Saunders Lewis, also a notable prose writer, and many others.

In prose Welsh literature is by no means so outstanding. The prose romances of the *Mabinogion* had few successors. The novelist, Daniel Owen (1836-95), whose studies of Welsh home life are still acknowledged to be in the front rank, was the pioneer of modern Welsh fiction, whose tradition is represented to-day by Thomas Rowland Hughes (his *O Law I Law* was pub. in Eng., 1950), Kate Roberts, Geraint Owen, and Islwyn Ff. Elis. In literary criticism the father of the modern school is Emrys ap Iwan (R. A. Jones, 1851-1906), whose successors include W. J. Gruffydd, T. Gwynn Jones, Saunders Lewis, and J. Gwilym Jones.

Music. Welsh music attained a high cultural standard in very early times, being upheld by the bards. Harp-tunes were the chief form of Welsh music, and *pennillion* competitions in which songs were improvised to a harp accompaniment, formed a great feature of Welsh life. These competitions and the activities of the bards are still continued in the Eisteddfodau of to-day (see BARD; EISTEDDFOD).

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Wales, Calvinistic Methodist Church in, or Presbyterian Church of, see CALVINISTIC METHODIST CHURCH OF WALES.

Wales, Church in, diocesan. 31 Mar. 1920, comprises 6 dioceses—St David's, Llandaff, Bangor, St Asaph, Monmouth, and Swansea and Brecon (a diocese which, with Monmouth, was formed after 1920). The office of Archbishop of Wales is filled by the election of one of the bishops to it. Until the Welsh Church Acts of 1914 and 1919, Wales was included in the Province of Canterbury; a Welsh archbishopric was formed on diocesan. A movement towards diocesan. had been gaining ground in Wales from the last quarter of the 19th cent. onwards; in 1906 a commission examined the state of the Welsh Church and found that less than a quarter of the people nominally belonged to it. In 1912 a measure of diocesan. was rejected by the Lords after being approved by the Commons, and diocesan. was not finally made legal until the Parliament Act. The Church has a communicant body of about 200,000, with 1850 churches throughout the principality. The languages used in services are Welsh and English, and the service book is the book of Common Prayer as used in the Church of England. See also DISTABLISHMENT.

Wales, Nat. Library, Aberystwyth. Founded in 1907, the building being formally opened in 1955, it is one of the 6 copyright libraries (q.v.) entitled, with certain reservations, to a free copy of every book pub. in the U.K. The stock contains over 1,000,000 printed books and 25,000 MSS., with many collections relating to Wales and the Welsh or other Celtic peoples. The Library also acts as a depository for manorial and other records, and contains many special col-

sections of documents of old Welsh families as well as a fine collection of private press books.

Wales, Prince of. The eldest son of the King of England, becomes at birth Duke of Cornwall, and on his succession to the throne the duchy vests in his eldest son; but the king can, if and when he chooses, create his son P. of W. and Earl of Chester by letters patent. It is now customary always to make the heir-apparent to the throne P. of W., but the title is not heritable. The life of the P. of W. and the chastity of his wife are protected by the Statute of Treasons (*see* TREASON). Provision is made for the Prince and Princess of Wales by the Civil List Act, 1901.

Wales, University of, founded in 1893 from a union of the colleges of Aberystwyth, Bangor, and Cardiff (Swansea being added in 1920). These are the constituent colleges of the univ., none taking precedence of the others. The Welsh National School of Medicine is situated in Cardiff. There are associated theological colleges at Brecon, Aberystwyth, and Carmarthen, and schools of theology at Cardiff and Bangor. The univ. grants degrees in almost all subjects. There are nearly 5000 students, also univ. extension courses.

Walewski, Alexandre Florian Joseph Colonna, Comte (1810-68), Fr. diplomat, b. Poland, son of Napoleon I and Marie, Countess Walewska. He became a naturalised Frenchman, and held sev. diplomatic posts. Under Napoleon III he was Fr. ambass. in London. He was minister of foreign affairs 1855-60.

Waley, Arthur David (1889-), poet and translator, b. Tunbridge Wells, his name being originally Schloss. Educ. at Rugby and King's College, Cambridge, of which he was made an honorary Fellow, he became one of the greatest authorities on Chinese literature. From 1912 to 1930 he was Assistant Keeper of the Dept of Prints and Drawings at the British Museum. He is chiefly remembered by his renderings of Chinese lyrics, which are so effective that they deserve to be regarded as poems in their own right; vols. of these were pub. in 1918, 1919, 1927, and 1946. He also wrote *Japanese Poetry*, 1919, and *Three Ways of Thought in Ancient China*, 1939. A Fellow of the British Academy, he was made a Companion of Honour in 1956.

Walfish Bay, *see* WALVIS BAY.

Walker, Horatio (1858-1938), Canadian artist, b. Listowel, Ontario. He began as water-colourist, and in 1888 won the Evans Prize of the Amer. Water-colour Society, but later devoted himself to oils. His subjects are chiefly Canadian landscapes and farm scenes, composed in a broad and simple manner showing the influence of Millet.

Walker, William (1824-1860), Amer. adventurer, b. Nashville, Tennessee. He was educ. at the univ. of Nashville, M.D. univ. of Pennsylvania, 1843. Later he was admitted to the bar at New Orleans. In 1853 he went on an expedition to conquer Mexican ter. and in 1854 pro-

claimed Lower California and the State of Sonora an independent rep. with himself as president. He was forced to abandon this project. Acquitted of violating the neutrality law, W. made further expeditions to Nicaragua, where the gov. he set up was formally recognised by Washington in 1856, to Mobile, and to Honduras, where he was executed in 1860.

Walking, *see* ATHLETICS.

Walkley, Arthur Bingham (1855-1926), journalist, b. Bristol. Educ. at Warminster School and Oxford, he worked on the Post Office staff, then became a dramatic critic, representing *The Times* for many years. His works include *Playhouse Impressions*, 1892, and *Dramatic Criticism*, 1903.

Wall, vil. of Staffordshire, England, 2½ m. from Lichfield, on Watling Street, and formerly the Rom. city of *Letocetum*. The Rom. baths are preserved by the National Trust. Pop. 300.

Wall, see WALLS.

Wall, Great, of China, *see* CHINA.

Wall-paper, *see* PAINTING AND DECORATING.

Wall Pellitory, *see* PELLITORY.

Wall Pennywort, *Umbilicus rupestris*, a native perennial herb of rocks and walls.

Wall Street, street of New York, the financial centre. It is a narrow thoroughfare 7 blocks long which runs from Trinity Church in Broadway to the E. R. In Wall Street and the thoroughfares in the immediate proximity are located most of the great banks, trust companies, insurance corporations, as well as the head offices of the big railway, steamship, metal, and coal companies. In this dist. are also located the Stock, Coffee, Cotton, Metal, Produce, and Corn Exchanges.

Walla Walla, co. seat of W. W. co., Washington, U.S.A., on Mile Creek. It is the centre of an important wheat-growing dist., and has flour mills and meat-packing factories. It is the seat of Whitman College and W. W. College. Pop. 24,102.

Wallaby, *see* KANGAROO.

Wallace, Alfred Russell (1823-1913), naturalist, b. Usk, Monmouthshire, began life as an architect, but interested himself in botany. In 1848 W. and H. W. Bates set out for the Amazon, but separated later. From 1854 to 1862 W. was in the Malay Archipelago; here he estab. the 'Wallace Line,' zoologically separating Lombok and Celebes from Bali and Borneo. His own work and the reading of Malthus's *Essay on Population* (which contained ideas tending towards Darwin's theory) led him to the idea of the 'survival of the fittest,' as a correlation of natural selection, and his own formulation of the law that every species originates in the same locality as a pre-existing closely allied species.

He wrote immediately to Darwin, who, noting the coincidence of views, communicated with Sir C. Lyell and Sir Joseph Hooker. As a result a joint paper was read, containing Darwin's views, to the Linnean Society on 1 July 1858. W.'s *Contributions to the Theory of Natural*

Selection appeared in 1870, and contained his views on evolution, differing in certain aspects from Darwin. The Royal Medal in 1868 and the first Darwin Medal, 1890, were presented to him by the Royal Society. He was president of the Entomological Society in 1870-1. In 1889 he received the degree of D.C.L. from Oxford. See life by E. D. Cope, 1891; and J. Marchant, *A. R. Wallace: Letters and Reminiscences*, 1916.

Wallace, Edgar (1875-1932), novelist and playwright, b. London. Left a destitute orphan, he was saved from the workhouse by a fish porter, who brought him up. He went to a Board school in Peckham and then worked in a rubber factory, on a Grimsby trawler, and as a milk-boy and newspaper seller. He then joined the Army and was in S. Africa during the war of 1899-1902. On leaving the Army he decided to turn journalist and returned to S. Africa as war correspondent for Reuter's agency. His first story was *The Four Just Men*, 1905, which he pub. at his own expense. After this W., with amazing energy, wrote or dictated about 150 novels in the space of 20 years. He found his true *métier* in the 'thrillers,' peculiarly his own creation, which he himself styled 'pirate stories in modern dress.' Typical titles are *The Man Who Knew*, 1919, *The Angel of Terror*, 1922, *The Crimson Circle*, 1922. *The Green Archer*, 1923, *The Clue of the New Pin*, 1923, and *Room 13*, 1924. He also wrote some good horror plays, and *People*, 1926, an autobiography. See life by Margaret Lane (his daughter-in-law), 1938.

Wallace, Henry Agard (1888-), Amer. politician, b. Adair (o., Iowa). He studied at Iowa State College. From 1933 he was secretary of agriculture in the Roosevelt administration, and in 1940 became vice-president. Truman (q.v.) was elected in his place in 1944, and W. became secretary of commerce. In 1946 he attacked the U.S. gov.'s attitude to Russia, and resigned. In 1948 he stood for the presidency as candidate of his newly formed Progressive party, but polled only 1,157,172 votes, out of a total of more than 47,000,000. When fighting broke out in Korea in 1950, W. announced his support for U.N. action there.

Wallace, Lewis (1827-1905), Amer. lawyer, diplomat, and novelist, b. Brookville, Indiana. After studying law, Lew., as he was generally called, served in the Mexican War and with the Union Army in the Civil war. From 1878 to 1881 he was Governor of New Mexico, and from then till 1885 Amer. minister to Turkey. His greatest success as a writer was with *Ben Hur*, 1880, a historical novel about the early days of Christianity; it sold some 2,000,000 copies, and he followed it with *The Boyhood of Christ*, 1888. His *Autobiography*, 1906, was completed by his wife.

Wallace, Sir Richard (1818-90), art connoisseur, b. London, and educ. in Paris, where he gathered together a valuable collection, sold in 1857. He then helped the Marquess of Hertford, his

half-brother, in forming his collection, which he inherited in 1876, and which was bequeathed by his widow to the nation in 1897, and is now housed in Hertford House, Manchester Square, London (see WALLACE COLLECTION).

Wallace, Vincent (1812-65), Irish composer, b. Waterford, pupil of his father, a bandmaster, appeared in Dublin as a boy organist and violinist, and in 1834 played a violin concerto of his own. After living abroad, mainly in Australia, in 1835-45, he produced his opera *Maritana* in London in 1845. It made him famous in Germany and France, and after some further successes, especially with *Lurline* and *The Amber Witch*, he received a commission from the Paris Opéra, which he was unable to complete owing to approaching blindness. He d. at a castle in the Pyrenees.

Wallace, Sir William (c. 1272-1305), Scottish patriot, b. probably at Elderslie, near Paisley. He came of a family of the lesser nobility of Scotland, and first took up arms against the English in 1297. It was an opportune moment for a Scottish rising. Edward I had taken advantage of the dispute about the succession to the Scottish throne to possess himself of the country. In 1296 he ravaged Scotland and made prisoner John de Balliol, at the time the occupant of the throne. John de Warenne was appointed guardian of Scotland, and Eng. sheriffs were set up in the S. shires, and in Ayr and Lanark. In 1297 the Eng. barons and clergy were in revolt against Edward I, while he was absorbed in preparations for the Fr. war. W. seized his opportunity, organised the Scottish insurgents in the name of John de Balliol, killed Sir Wm Hazelrig, the Eng. sheriff of Lanark, and became Guardian of Scotland. He next drove the English out of Perth, Stirling, and Lanark shires, besieged Dundee and Stirling castles, and defeated the English at Stirling Bridge. All this was the work of 1297; but after ravaging Northumberland, Westmorland, and Cumberland, he was defeated by Edward I at Falkirk (1298) and resigned the Guardianship of Scotland. After this he withdrew to France and solicited aid from Norway, France, and the Pope; but being refused, returned to Scotland, and carried on a guerilla warfare (1303-5). He was declared an outlaw by Edward I (1304), and having been captured by treachery at Glasgow (1306) was brought to London, tried, and executed the same year. See life by J. Ferguson, 1938.

Wallace Collection, famous art museum, at Hertford House, Manchester Square, London, originally formed by the 4th Marquess of Hertford (1800-70) and bequeathed to the nation, 1897. Fr. art of the 18th cent. is a distinctive feature of the collection, much of it coming from the Royal Châteaux, including sculpture, furniture, and small *objets d'art*, as well as paintings by Watteau, Poucher (qq.v.), and others. There are many fine paintings also of various national schools, including Velázquez' 'Lady with a Fan' and Hals' 'The Laughing Cavalier.'

Wallace Line, *see under* WALLACE, ALFRED RUSSELL.

Wallach, Otto (1847-1931), Ger. chemist, b. Königsberg. He was a prof. at Bonn in 1876, and at Göttingen from 1889 to 1915. He worked on camphor and terpenes, and on volatile oils and scents, winning the Nobel prize for chemistry in 1910.

Wallachia, or **Munténia**, prov. of Rumania, lying between the Carpathians and the Danube, the Black Sea, and Yugoslavia. W. was one of the 2 Danubian principalities (the other being Moldavia), in the union of which the kingdom of Rumania had its origin under the treaty of Paris, April 1856. W. is the prin. agric. area of the country. Area 29,960 sq. m.; pop. 6,579,000.

Wallaroo, tn of S. Australia on the E. shore of Flinders Gulf, 110 m. by rail from Adelaide. Its chief industries are now 2 superphosphate works and a clothing factory. Pop. 3000.

Wallas, Graham (1858-1932), sociologist and political scientist, b. Sunderland; educ. at Shrewsbury School and Corpus Christi College, Oxford.

His most important work on sociology, *Human Nature in Politics*, did not appear until 1908. W. was a lecturer at the London School of Economics, 1895-1914, and prof. of political science at London Univ., 1914-23.

Wallasey, co. bor., largely residential, of Cheshire, England, on the SW. side of the Mersey estuary, opposite Liverpool. W. developed as a residential tn within the Merseyside area, and became a co. bor. in 1913; it includes the townships of W., Egremont, Liscard, Poulton-cum-Seacombe, and the popular seaside resort of New Brighton. Under the Town Planning Act, 1947, a start was made on the detailed planning of the Moreton and Lensoway areas (added to the bor. in 1928) to provide facilities for community needs of an ultimate additional pop. of 34,000 there. These, with Soughall Massie (added to the bor. in 1933), form modern residential suburbs. The corporation owns ferry, motor-bus, and water undertakings, and W. has 5 m. of promenade, parks, pleasure grounds, and a pier. There are 5 grammar schools, the oldest (W. Grammar School, a boys' public school) being founded in the 16th cent. Industries include flour milling, and manufs. of beltings, tyres, bronze propellers, and chocolate biscuits. Pop. 102,100.

Wallenstein, or **Walstein**, **Albrecht Wenzel Eusebius von** (1583-1634), Ger. soldier, Duke of Friedland, b. Bohemia. His father was a Protestant, but he early determined to embrace the Catholic faith. He took part in the war between the archduke Ferdinand and the Venetians. On the outbreak of the Bohemian revolt he obtained the command of an army, defeated Mansfeld (q.v.), and conquered a great stretch of country. He was created Duke of Mecklenburg by the emperor. In 1632 he was defeated at Lützen by Gustavus Adolphus. The Emperor decided that W. had become too powerful for Hapsburg safety. He was

charged with treachery, and murdered. *See* lives by L. von Ranke, 1910; H. von Srbik, 1920; W. Tritsch, 1936; F. Watson, 1938. *See also* C. V. Wedgwood, *The Thirty Years War*, 1944.

Waller, Edmund (1606-87), poet and politician, b. Colehill, Buckinghamshire. Educ. at Eton and Cambridge, he was a student of Lincoln's Inn in 1622, and 4 years later was M.P. for High Wycombe, and for Amersham in 1628 and 1640. In this latter year he sat in the Long Parliament. He was at heart a royalist, and having been caught plotting to seize London for Charles I, was arrested and expelled from the House (1643). He was a prisoner in the Tower (1643-4), but his sentence of death was commuted to a heavy fine and banishment. He was, however, pardoned in 1651 by Cromwell's influence, and pub. laudatory verses upon him in 1655. But he also wrote poems of rejoicing on Cromwell's death (1658), and in 1660 pub. *To the King, upon his Majesty's Happy Return*. His *Divine Poems* appeared in 1685. Acknowledged in the 18th cent. as a pioneer of the neo-classical style in poetry, he is now chiefly known for the lyrics he wrote to the lady he called Sacharissa, identified with Lady Dorothy Sidney. *See study* by G. Thorne-Drury, 1893.

Waller, Lewis (1860-1915), actor-manager, probably the finest romantic actor the Eng. stage ever possessed. He excelled in 'costume' drama of the romantic type which reached its culmination in his production of *Monsieur Beaucaire* in 1902. He was also a magnificent Shakespearean actor, excelling as Lysander, Faulconbridge, Brutus, and especially Henry V. He was the first actor in whose honour what is now known as a 'fan club' was formed; the ladies who formed it called themselves 'The Keen on Wallers.' He had magnificent diction and vocal powers and great personal magnetism.

Wallflower (*Cheiranthus cheiri*), fragrant cruciferous perennial plant, a number of beautiful varieties of which are grown in gardens, bearing yellow, brown, red, and variegated flowers. They are usually treated as biennials, the seed being sown in May.

Walling, Curtain, a system of external walling for framed buildings, in the form of a lightweight skin attached *outside* the frame so that it is uninterrupted by columns, beams, or floor slabs. This sheathing may be simply of sheet metal or glass, but will often be of sandwich or cavity construction, similar to that of panel walls (q.v.), to provide adequate sound and heat insulation. For large buildings, C. W. needs to be carefully designed; the joints need to allow for movement with changes of temperature while keeping out wind and rain, and the method of fixing to the building frame has to resist high wind pressures. *See Building Research Station Digests Nos. 98 and 99, Light Cladding*, 1957.

Wallingford: 1. Municipal bor. and mkt tn of Berks, England, on the r. b. of the Thames, about 48 m. by road from

London, centre for an agric. dist. It is the site of a Rom. camp, and is mentioned in Domesday Book. Pop. 3800.

2. Tn in New Haven co., Connecticut, U.S.A., in an agric. and dairy region. It has silverplate works and manufs. metal products, electrical equipment, hardware, tools, plastics, clothing, chemicals, and cutlery. Choate School for boys is here. Pop. 17,000.

Wallington, par. of Surrey, England, 2 m. W. of Croydon, formerly noted for its cultivation of lavender. It forms with Beddington a single municipal bor. Pop. 32,757.

Wallis, John (1616-1703), mathematician, b. Ashford, Kent, was Savilian professor of geometry at Oxford, 1649-1703, and keeper of the archives, 1658-1703. He introduced the principles of analogy and continuity into mathematical science, and widened the range of higher algebra. He pub. *Arithmetica Infinitorum*, 1655, which contained the germs of the differential calculus, and invented the symbol ∞ for infinity. He wrote the first mathematical treatise on the tides, also a treatise on *Analytical Conic Sections*, 1664, and *Algebra*, 1686.

Wallis (Switzerland), see VALAIS.

Walloon, inhab. of S. and SE. Belgium (Wallonie) and of the Fr. depts Ardennes, Aisne, and Nord. They speak different varieties of a romance dialect (see under ROMANCE LANGUAGES), which contains also some Celtic roots and many words of Flemish origin. Walloon is commonly, but not quite accurately, considered as 'Belgian French'; indeed, the origin and the development of Walloon is in many ways parallel with those of mod. French (the Walloon part of Belgium was occupied by Rom. forces for cents.). In contrast to French the vowels are pronounced less distinctly. Final syllables are omitted very often, and Walloon dialects show the characteristic singing accent. From the 12th till the 15th cent. sev. chronicles were composed in the Walloon dialect. In the 17th cent. it is found again in literary works. From that time Walloon literature has existed; it is regional but very lively. For many years there has been friction between the W. and the Flemings (Ypres, Courtrai, Brussels, and Liège may be considered as situated on the 'border line' between the W. and the Flemings). Both in the First and in the Second World Wars the W. accused the Flemings of disloyalty to the Belgian state. Between the two wars the Flemings were successful in securing official recognition for the Flemish tongue. In 1950 King Leopold's restoration for a brief period led to a secessionist campaign by the W. (who were more strongly against his return than the Flemings), and the threat of civil war. See J. Destrée, *Wallonie*, 1914; M. Valkhoff, *Philologie et littérature wallones*, 1938; M. Piron, *Les lettres wallones contemporaines*, 1944; E. Baudart, *L'aventure de la Wallonie*, 1945; and L. Remède, *Le Problème de l'ancien Wallon*, 1948.

Walls. The most common types of W. in Great Britain are the external and

internal wall to the usual small house. The external wall performs 2 main functions: it acts as a screen to the weather, and it supports the upper floor and the roof. The wall is often built in 2 leaves with a 2-in. cavity between them; the 2 leaves are bonded together by wall ties, usually of twisted or indented metal to prevent moisture creeping across the cavity. The inside of the wall is usually covered with $\frac{1}{2}$ in. of plaster to give a smooth finish, though in recent years many have been lined with boards, usually of wood fibre or plaster.

The external W. minimise the passage of sound and heat, and there is an increasing tendency to use special insulating materials to prevent the escape of heat and thus cut down fuel costs. The internal W. to small houses are usually half-brick thick or timber studding faced on both sides with plaster, or wood-fibre or plaster boards. For other buildings, such as schools, blocks of flats, or industrial buildings, the W. are thicker, 13½ in., or 18 in., etc., often decreasing in thickness by 4½-in. reductions as the wall rises. But the increasing tendency is to build W. of large buildings on the frame and panel method; that is, a frame of steel or reinforced concrete is first erected, and the panels (or voids between the members of the frame) filled in with brickwork, concrete, stonework, or light sheet materials. The frame thus supports the building and loads, and the panels act as a screen against the weather and passage of heat and noise. This introduction of panel or curtain walling brings with it new problems of jointing; with large panels, each joint has to be able to take up considerable movement due to temp. or moisture changes, while remaining weatherproof. This has stimulated the development of new jointing *mastics* (q.v.). Although stress has been laid here on brick construction, in some dists., as in the Cotswolds, stone is the usual walling material, and in other places concrete is largely used. The concrete is either laid *in situ*, by pouring it between 2 sheets of shuttering, or is pre-cast in the form of blocks and laid like masonry. Other materials have been largely used for the W. of prefabricated houses. Thousands of the latter have been built of asbestos-cement sheets along with special insulation of various kinds, or of 2 sheets of resin-bonded plywood stuffed between with slag wool, or even of insulated steel or aluminium sheets. In comparison with W. of ant times, modern W., particularly for large buildings, are scientifically designed; they have, for a minimum amount of material, a calculated strength, heat, and sound insulation, etc. Old W. were built by rule-of-thumb methods, were often of massive thickness, and sometimes used for military defence, both in buildings and to protect tns and cities. These are often of great beauty, especially the red-brick W. of Eng. country houses and parks.

Wallsend, tn and municipal bor. of Northumberland, England, situated on the Tyne. Its name is taken from its

position at the E. end of Hadrian's Wall (q.v.). Its chief industries are coal mining, shipbuilding, engineering, rope-making, coal-gas production, plastics, and the manu. of plywood. Pop. 49,130.

Walmer, tn and seaside resort on the coast of Kent, England. Since 1935 amalgamated with the bor. of Deal, it is one of the reputed landing-places of Julius Caesar. Walmer Castle, residence of the Lord Warden of the Cinque Ports, was built by Henry VIII in 1539 as one of a series of forts for the defence of the SE. coast against artillery assaults.

Walney Island, is. 10 m. long, opposite Barrow-in-Furness, Lancs, England. It is joined by a bridge to Barrow. The suburb of Vickerstown is on the is.

Walnut (*Juglans regia*), tree of the family Juglandaceae; the Eng. variety, the Persian W., is hardy though not a native. Other varieties are found in the Far E., and the Black W. in America, the latter forming the bulk of supplies in Britain. Besides its nuts, which are of much value as a dessert delicacy, the wood is in great demand by cabinet-makers; burred wood, chiefly obtained from Mediterranean countries, is valuable for veneers. Sugar has been made from the sap, and the aromatic leaves have been used in pharmacy.

Walpole, Horace, 4th Earl of Orford (1717-97), author and letter-writer, b. London, the youngest son of Robert W. (q.v.). At the age of 22 he visited France and Italy, together with the poet Gray. Whilst on the tour he met Horace Mann, with whom he maintained a correspondence for some very considerable period, and in France formed a friendship with Madame du Deffand. He returned to England, having quarrelled with Gray, and entered Parliament, holding a seat continuously up to 1768. It is, however, not as a politician but as an author that he is famous. His memoirs and correspondence are of the greatest importance to students of the life and times of the middle 18th cent. He lived at Strawberry Hill, Twickenham, from 1747. This he converted into 'a little Gothic castle' and his house became the centre of fashionable learning in England. He set up a printing press there and pub. much that was his own and his friends'. Gray's *Odes* were issued from here, as was his own *Castle of Otranto*, 1765, pub. under a pseudonym and as a 'Gothic romance' from the It. This estab. the vogue of the 'terror novel.' His memoirs include: *Reminiscences*, 1805, *Memoirs of the last Ten Years of the Reign of George II*, 1822, and *Journal of 1771-83*, 1859. He also wrote a tragedy, essays, prologues, and many *jeux d'esprit* in prose and verse; but his greatest work was his *Letters*. In style these show something of the polish and refinement of Madame de Sévigné and the epigrammatic felicity of Voltaire. The *Letters* were ed. by Mrs Paget Toynbee (1903-5), and by W. S. Lewis (1937), and his *Works* by Mary Berry and others (1798-1825). See lives and studies by L. B. Seeley, 1884; A. Dobson, 1890; P. Yvon, 1924; D. M.

Stuart, 1927; L. Melville, 1930; S. Gwynn, 1932; E. W. Ketton-Cremer, 1946; also A. T. Hazen, *Bibliography of the Strawberry Hill Press*, 1942.

Walpole, Sir Hugh Seymour (1884-1941), Eng. novelist, b. Auckland, New Zealand, son of George W., Bishop of Edinburgh. He was educ. at King's School, Canterbury, Bede College, Durham, and Emmanuel College, Cambridge. He wrote with much distinction on the cathedral city environment, and *The Cathedral*, 1922, is his finest work in this particular sphere. His first novel, *The Wooden Horse*, appeared in 1909, and W. estab. himself in Chelsea as a writer. His next 3 novels were produced in fairly rapid succession, *Maradick at Forty*, 1910, *Mr Perrin and Mr Traill*, 1911, and *Prelude to Adventure*, 1912, the second of these, a study of school life, attracting much attention. But his first big success was *Fortitude*. His experiences in Russia during the First World War suggested his *The Duchess of Wreace*, 1914, a penetrating study of an autocratic personality symbolic of a social system in decay; *The Dark Forest*, 1916; and *The Secret City*, 1919, for which he was awarded the James Tait Black Prize. W.'s later writing is dominated, however, by that massive and gorgeously tapestried historical work, the tetralogy of *Rogue Herries*, 1930, *Judith Paris*, 1931, *The Fortress*, 1932, and *Vanessa*, 1933, which form his 'Lakeland saga,' a most sustained product of the modern romantic revival and one which endowed historical fiction with a new life. An able critic, he wrote studies of Conrad, 1916, and Trollope, 1928. He was knighted in 1937. See studies by Marguerite Steen, 1933; and R. Hart-Davis, 1952.

Walpole, Sir Robert, first Earl of Orford (1676-1745), statesman, b. Houghton, Norfolk. He studied at King's College, Cambridge. A Whig by persuasion and upbringing, he entered Parliament in 1701 as M.P. for Castle Rising, and in the next Parliament the first of the reign of Queen Anne, for Lynn. He quickly distinguished himself, and in 1708 he became secretary for war. On the accession of the Tories in 1712 he was accused of peculation, and was dismissed his office and sent to the Tower. The Protestant succession, however, restored him to favour, and in 1715 he became chancellor of the Exchequer. On the dismissal of Townshend he resigned and opposed strongly the policy of Stanhope and Sunderland on every possible count, without regard for principle. His greatest victory in opposition was the rejection in 1718 of the Peerage Bill, which limited the prerogative of the Crown and which would have increased enormously the power of the House of Lords. In 1720 he returned to the Pay Office, just before the South Sea crisis broke. He succeeded Sunderland at the Treasury in 1721, but only after Sunderland's sudden death (1722) was W. really the king's chief minister, and for the next 18 years his position was undisputed.

W.'s handling of the South Sea crisis

showed to the full his common sense, tenacity, and skilful, unprincipled manipulation of people and events. It is now estab. that W. was not in fact a great financial minister: he himself lost heavily in the South Sea speculations, although he amassed an enormous fortune through speculation during his political career as a whole. He maintained his position by retaining the confidence of the Court, and by controlling the Commons by his wholesale managing of M.P.s and of parl. elections. In 1739 the war of 'Jenkin's Ear' was declared, and W. ought to have resigned, since he had declared war much against his will, but he clung to office, and only resigned when his majority had dwindled to 2. He was raised to the peerage as Earl of Orford. The position which he occupied and the doctrine of ministerial cohesion which he applied are generally considered to justify his being regarded as the first effective Eng. Prime Minister. See lives by W. Cole, 1798, and J. H. Plumb, 1956. See also Sir L. B. Namier, *The Structure of Politics at the Accession of George III*, 1929.

Walpurga, St (Walpurgis or Walburga) (d. c. 779), sister of SS. Willibald and Winebald. She became a nun at Wimborne, Dorset, and at the invitation of St Boniface followed St Lioba to Germany, becoming abbess of Heidenheim until her death. Her relics were transferred to Eichstätt, where a convent was erected in her honour. Throughout all Germany, and even in France, the Netherlands, and England, churches and chapels were dedicated to her. The feast of W. falls properly on 25 Feb., but in some Ger. calendars it is assigned to 1 May, which day, with its promise of returning summer, was already associated with various heathen celebrations, from which the ann. Witches' Sabbath on Walpurgis-Night took form. (See Goethe's *Faust*.) A mysterious fluid, known as St W.'s oil, still flows periodically from beneath her shrine and is distributed far and wide to those in physical or spiritual need.

Walrus, Sea Horse, Sea Cow, or Morse (*Odobenus*), large marine carnivore. The Pacific W. (*O. obesus*) occurs around Alaska and the NE. Siberian coasts. The Atlantic W. (*O. rosmarus*) is found in Spitzbergen and other European is. of the far N. The W. has been ruthlessly hunted for its immense tusk-like upper canines, its hide, and its oil. It is a gregarious animal, and quiet and inoffensive in disposition except during the breeding season, or if attacked, when it is capable of fighting fiercely. It averages 10-12 ft in length, though specimens nearly twice as long are recorded. The muzzle is divided between the nostrils, and bears bristly moustaches. The eyes are small, and there is no external ear. The adult animal has only 1 incisor and 3 premolar teeth at each side of the upper jaw besides the tusks; in the lower jaw only 3 premolars and 1 small canine occur on each side. Bivalve molluscs are its prin. diet, these being dug up from the sea bottom by means of the tusks.

Walsall, mrkt tn. co. and municipal bor. of Staffordshire, England, 8 m. NW. of Birmingham. Queen Mary's school was estab. in 1554. It has trade in harness, saddlery, and leather goods as well as in engineering and hardware. Pop. 114,900.

Walsham, North, urban dist. and mrkt tn. of Norfolk, England, 14 m. NNE. of Norwich. The 16th-cent. grammar school was attended by Nelson. Agric. machinery is manuf. Pop. 4733.



The Zoological Society of London

WALRUS

Walsingham, Sir Francis (c. 1530-90). Eng. statesman, b. Chislehurst, Kent, and educ. at King's College, Cambridge. He was a fervent Protestant, and travelled widely in Europe during Mary's reign, but on the accession of Elizabeth I returned to England, and in 1569 acted as chief of the secret service in London. He was ambas. to France 1570-3, and secretary of state from 1573 until 1590. He secured the convictions of Wm Parry, 1585, Anthony Babington, 1586, and Mary, Queen of Scots, 1586.

W.'s whole administration of foreign affairs was founded on a system of espionage and bribes, but his diplomatic methods were balanced by an undoubted personal integrity and disinterested patriotism. See C. Read, *Mr Secretary Walsingham and the Policy of Queen Elizabeth*, 1925.

Walsingham, Thomas (d. c. 1422), monk and historian, was preceptor and superintendent of the scriptorium of St Albans Abbey, and afterwards prior of Wymondham. He is the prin. authority for the reigns of Richard II, Henry IV, and Henry V. He compiled parts of *Historia Anglicana 1272-1422* (ed. H. T. Riley, 2 vols. in Rolls series), 1863, *Chronicon Angliæ*, 1328-88, *Ypodigma Neustriæ*, a record of events in Normandy, and *Gesta Abbatum*.

Walsingham, vil. of Norfolk, England, famous in history for its Chapel of Our Lady, with which miracles have been associated since before the Norman Conquest. From then until the Reformation

W. was unrivalled in England as a centre of pilgrimage, being visited by every king and queen of England. Of the Chapel Erasmus wrote, 'When you look in, you would say it was the mansion of the saints, so much does it glitter on all sides with jewels, gold and silver.' W. Augustinian Priory, founded by Geoffrey de Faverches in 1153, is now in ruins, but its proportions can still be distinguished. The Franciscan Friary, also in ruins, is 14th cent. In recent times W. has again become a place of pilgrimage, the centre now being the Slipper Chapel, 1 m. from the vil. An Anglican shrine has also been erected in W. Pop. (Little W. and Great W.) 1150.

Waltari, Mika (1908-), Finnish author, educ. Helsinki Univ. He was literary reviewer for the Finnish Broadcasting Co. (1937-8) and ed. a weekly illustrated magazine (1936-8). He won sev. literary prizes in Finland, and his works, including *The Egyptian*, 1949, have been trans. into English and other languages.

Walter, Bruno (1876-), Ger. conductor and composer, b. Berlin. He graduated at the Stern Conservatory there and spent his early years as conductor in the opera houses in various Ger. cities. He was much influenced by Mahler, whom he accompanied to Vienna in 1901. He remained there as assistant conductor at the Court Opera until 1913, when he went to Munich as Music Director. By the time he resigned that post in 1922 he had estab. a European reputation. In that year he took part in the Salzburg Festival with which he was associated for many years. He conducted in Berlin and Leipzig until 1933, when on his dismissal by the Nazis he went as conductor to the State Opera in Vienna. After the Ger. annexation of Austria he became a Fr. citizen, and has since conducted mainly in New York but also in France, Italy, and Great Britain.

Walter, Hubert (d. 1205), cleric and administrator, b. probably at W. Dereham, Norfolk. W. may have been trained in Glanvill's household: after a series of rapid civil and eccles. promotions he became, in 1193, Archbishop of Canterbury and justiciar. Some historians suggest that *Tractatus de Legibus et Consuetudinibus Anglie*, commonly attributed to Glanvill, was in fact compiled under W.'s direction.

Walter, John, name of 3 successive proprietors of *The Times* (q.v.): (1) (1739-1812) founder and first editor, son of a London coal-merchant, whose business he followed prosperously till 1781. He was also an underwriter till 1782. He set up a printing business in Printing-House Square, 1784, and printed, 1 Jan. 1785, the first number of *Daily Universal Register*, which was renamed *The Times*, 1 Jan. 1788. (2) (1776-1847), chief proprietor; b. probably at Battersea, second son of the founder. Educ. at Merchant Taylors' School and Trinity College, Oxford. He succeeded his elder brother as manager, 1803, and was editor till c. 1810. (3) (1818-94) chief

proprietor, b. Printing-House Square, eldest son of the last-named. Educ. at Eton and Exeter College, Oxford, he was called to the Bar at Lincoln's Inn, 1847. He became sole manager on his father's death.

Walters, Lucy (c. 1630-58), daughter of a S. Wales squire, and mistress or wife of Charles II. She went to the Hague, where she became the mistress of the exiled Prince of Wales (later Charles II) in 1648. At Rotterdam on 9 Apr. 1649 she bore Charles a son, James, whom he created Duke of Monmouth. See Lord George Scott, *Lucy Walters, Wife or Mistress?*, 1948.

Waltham, city of Middx co., Massachusetts, U.S.A., on Charles R. 10 m. W. of Boston. It has the Amer. Waltham Watch Company, one of the largest watch factories in the world, and numerous cotton mills, the first one in America being estab. here in 1814. W. also manufs. machinery, tools, precision instruments, gauges, foundry products, and clothing; it has a printing industry. The Brandeis Univ., Fernald school, and an army hospital are situated here. W. was settled in 1634 and incorporated as a city in 1884.

Waltham, Waltham Abbey, or Waltham Holy Cross, anct mrtk tn on the R. Lea, 12½ m. from London and an urb. dist. of Essex. It is now famous chiefly for its important anct abbey church. The church of Holy Cross was founded in 1060, on an earlier foundation, by King Harold; Henry II converted it into a priory, and, in 1184, it became an abbey. There are manufs. of plastics and chemicals, and horticultural and scientific estab. Pop. 8940.

Waltham Cross, dist. of Herts, part of the urb. dist. of Cheshunt, about 13 m. from London. Here is one of the crosses erected by Edward I to commemorate the resting stages of the body of Queen Eleanor on its way to Westminster Abbey.

Walthamstow, residential and industrial suburb in the metropolitan area of Essex, on the l. b. of the Lea. It includes 300 ac. of Epping Forest. Wm Morris was b. in W. A civic centre was opened in 1941. There are plastics and light-engineering industries, etc. W. has 2 members of Parliament. Pop. 119,400.

Walther von der Vogelweide (c. 1170-c. 1230), Ger. Minnesinger, probably a native of Tyrol. He served in turn many masters, and wandered all over Europe. The greatest of Ger. medieval poets, his mastery lay in his wealth of tone and feeling. His lyric verse is of exquisite tenderness, whilst his national poems are powerful and rich in ideas. His works have been ed. by Lachmann-Kraus (10th ed., 1936), and trans. by M. F. Richey, *Selected Poems*, 1948. See studies by A. E. Schönbach, 1890, 1924; C. Bützler, 1940.

Walton, Izaak (1593-1683), author, b. Stafford. He was apprenticed to an ironmonger in London, and by 1614 was in possession of a business of his own. He had before 1619 begun to write verses,

and in 1640 he prefixed a life of Donne to the first folio ed. of that author's *Sermons*, which was much approved by John Hales. He afterwards issued separately an improved ed. of his *Life of Donne*, 1658. In 1651 he pub. his *Iteliquae Wottonianae* with his *Life of Sir Henry Wotton*, and 2 years later produced his famous treatise *The Compleat Angler, or the Contemplative Man's Recreation*, one of the most delightful books in the Eng. language. In 1665 he pub. his *Life of Richard Hooker*, and in 1670 appeared his *Life of George Herbert*, followed in 1678 by that of *Bishop Sanderson*. C. Cotton's dialogue between Piscator and Viator was pub. as a second part in the fifth ed. of *The Compleat Angler*. See complete ed. of works ed. by G. L. Keynes, 1929.

Walton, Sir William (1902-), composer, b. Oldham, studied at Oxford, but was mainly self-taught and remained remarkably uninfluenced, except by the Sitwell family on the literary and cultural side. In 1923 he first appeared at the festival of the International Society for Contemporary Music, at Salzburg. He then lived mainly in London, where in 1934 his *Symphony* was performed, although still without a finale. In 1937 he received the hon. D.Mus. from Durham Univ., and in 1942 from Oxford, and he was knighted in 1951. Since his marriage in 1948 he has lived for some time of each year at Ischia. The greatest event of his career, and an important one in the history of opera, was the production of his first work in that form, *Troilus and Cressida*, at Covent Garden in 1954. He writes with extreme deliberation (the finale of the *Symphony* followed 3 years after the other movements) and with great finish, in an idiom that is entirely his own even if it shows occasional traces of the influence of Elgar or Sibelius and, in *Troilus*, Verdi and Strauss. His work has been found fault with for not being 'up to date,' but such assessment is itself faulty because it leaves his strong individuality out of account. His works include a ballet, *The Quest* (after Spenser), 1943, incidental music for *Macbeth*, film and radio music, *Te Deum* for the coronation of Queen Elizabeth II, 1953; *Belshazzar's Feast*, in *Honour of the City of London* (Dunbar) and other choral works, overtures *Portsmouth Point* and *Scapino*, *Symphony* and other orchestral music; *Facade* (Edith Sitwell) for recitation and chamber orchestra; *Sinfonia concertante* for piano and orchestra, concertos for violin, viola, cello, piano Quartet, 2 string Quartets; Sonata for violin and piano; piano *Duets for Children*; and a few songs. See F. Howes, *The Music of William Walton* (Musical Pilgrim, 2 vols.), 1942-3.

Walton Heath, see BANSTEAD.

Walton-le-Dale urb. dist. of NW. Lancs, England, on the Ribble; it has cotton mills, corn mills, and iron foundries. The Unicorn Inn was Cromwell's H.Q. in 1648. Pop. 14,870.

Walton-on-Thames, urb. dist. (with Weybridge) and tn of Surrey, England, a favourite resort for boating and angling,

and a residential suburb of London. Pop. (W. and Weybridge) 39,420.

Walton-on-the-Naze, or **Walton-le-Soken**, urb. dist. and par. of NE. Essex, England, 7 m. S. of Harwich; a seaside resort. Pop. (with Frinton) 9900.

Waltz, dance in 3/4 time first known in Austria and Bavaria about 1780, and assumed to have been derived from the popular *Ländler*. In Germany and France it became a favourite in high society. In England, although W. melodies were appreciated, the position taken by the dancing couples so shocked the public sense of decorum, that the dance itself was not accepted in the ballroom until 1812. Even then it was performed at half the tempo of the giddy whirl enjoyed by the Germans, Eng. dignity of the period being unaccustomed to 'fast dancing.' Once estab., it held pride of place for many years, remaining popular to the present day. During these decades, the W. has adopted different forms and tempos, as the German W., the French Valse, the Sautouse. The *Waltz-à-trois-temps*, in effect, was the German W., while the later, and quicker, *Waltz-à-deux-temps* was akin to a gallop. The modern W. has developed a style technically different, and slower in tempo than the original dance. Of recent years, the popularity of Old Time dancing has revived the early W., based on 19th-cent. style. Weber and Schubert were among the first masters to cultivate the W. seriously, and the elder J. Strauss and Lanner among the first ballroom composers to develop its vogue in Vienna, whence it spread rapidly all over Europe. As a medium for instrumental music it was used by Chopin, Brahms, and others. See M. Carner, *The History of the Waltz*, 1948.

Walvis (Walfish) Bay, bay on the W. coast of Africa. Most of the imports of SW. Africa are landed at W. B., the only good harbour on that coast. It is the principal seaboard terminus of the SW. Africa railway. An important fishing and canning factory has been created at W. B. Pop. (European) 2000; (others) 2000. Seasonal influx of labour about 4000.

Wampum, Amer. Indian name for perforated shell beads, woven into articles of personal adornment, and used in many forms as a medium of exchange of goods and property, i.e. as currency. The W. was also employed for sealing treaties and as means of recording important events; it thus became a symbolic device for communications, i.e. a sort of writing. Broad belts or collars were formed of strings of W. arranged in patterns, sometimes representing pictographs, according to the story to be recorded.

Wand, John William Charles (1885-), Bishop of London, 1945-56; educ. at King's School, Grantham, and St Edmund Hall, Oxford. His first curacy was at Benwell (1908-11); after this he was at Lancaster, 1911-14, a temporary chaplain to the forces, 1915-19, and honorary chaplain to the forces, 1919-22 and from 1925. After the First World

War he held a living at Salisbury and was appointed to a number of academic posts at Oxford. From 1934 to 1943 he was Archbishop of Brisbane and Metropolitan of Queensland; 1943-5 he was Bishop of Bath and Wells, being translated to the see of London in 1945. He retired in 1956, and was followed in his see by Dr H. C. M. Campbell (q.v.). He has written many books, among them *New Testament Letters*, 1944, *The Anglican Communion* (ed.), 1948, *History of the Early Church to AD 500* (3rd ed.), 1949, *History of the Modern Church* (7th ed.), 1952, *What the Church of England Stands for*, 1951, *The Life of Christ*, 1954.

Wandering Jew, see JEWS.

Wandiwash, or **Vandivasu**, tn of Madras state, India. It was the scene of the decisive victory by Eyre Coote over the French on 22 Jan. 1760, by which Fr. power in S. India was finally ousted.

Wandsworth, parl. and metropolitan bor. of SW. London, the westernmost bor. on the S. bank of the Thames. This largest of the bors. comprises the old vills. and hamlets of W., Putney, Roehampton, Clapham, Streatham, Tooting (q.v.), and Balham. W. takes its name from the R. Wandie, and was originally a fishing vil. Huguenots settled here after the revocation of the Edict of Nantes (1685), and engaged in hat-making; their burial ground is at East Hill. The industries include oil-mills, dye works, paper mills, calico-printing, and brewing. The W. Prison was built in 1851. There is a fine common of 183 ac. The bor. returns 4 members to parliament. Area 9108 ac.; pop. 333,900.

Wanganui, city and port, on the W. coast of N. Is., New Zealand, on the Wanganui R., 134 m. N. of Wellington by rail. It is the depot and port for a large area of pastoral and agric. country. The chief industries are freezing works, engineering works, woollen mills, steel-pipe works, fertiliser and chemical works. The magnificent scenery of the upper riv. attracts many overseas tourists and holiday makers from other parts of New Zealand. Pop. 32,106.

Wangaratta, tn of Victoria, Australia, 130 m. NE. of Melbourne, at the junction of the Ovens and King Rrs., and the cos. of Bogong, Delatite, and Moira. It is the centre of an agric. dist. producing hops, tobacco, and broom. There are woollen mills and a rayon factory. Pop. 8700.

Wankie, tn in S. Rhodesia, 212 m. by road from Bulawayo and chief coal-mining area of S. Rhodesia. The discovery of coal here was the reason why Rhodes diverted the N. to S. railway. The W. coalfields cover at least 400 sq. m., and reserves are conservatively estimated at 4,000,000,000 tons. Present production (1956) averages 3,000,000 tons per annum. Pop. (Europeans), 1123.

Wanks River (Nivcaragua), see COCO.

Wansbeck, riv. of England, rising in the Wannies, a group of hills in central S. Northumberland, and flowing 23 m. through a wooded valley past Morpeth to the N. Sea.

Wanstead and Woodford, municipal bor. (since 1937) of Essex, England, situated on the outskirts of Greater London, 10 m. from the City, and including 730 ac. of Epping Forest. It is predominantly residential in character, and forms the parl. bor. of Woodford. Pop. 61,820.

Wantage, mkt. tn of Berkshire, England, 25 m. NW. of Reading. It is famous as the bp. of Alfred the Great. There is trade in agric. produce and engineering works. Pop. 5430.

Wapenshaw (A.-S. *waepen*, weapon; *sceawian*, to show), in Scots feudal history, an exhibition of arms, according to the rank of the individual, made formerly at certain times in every dist. Such exhibitions or meetings were not designed for military exercises, but with the object of showing that the lieges were properly provided with arms.

Wapentake (Old Norse *udpnatak*, touching of weapons), div. of those Eng. cos. which were settled by the Danes, corresponding to the 'hundred' (q.v.) elsewhere.

Wapiti (*Cervus canadensis*), large and magnificent deer once widely distributed throughout N. America, now limited to the Rockies and the Cascades. It is also found in NE. and Central Asia. In N. America it is known as the 'Elk.'

Wapping, riverside dist. in the bor. of Stepney, E. London, containing the London Docks. The name has a connection with the originally marshy nature of the ground. W. was notorious in the 18th and early 19th cents. for its drinking dens for sailors. Execution Dock, which stood c. 1850 E. of W. Old Stairs, was the place of execution for crimes committed on the high seas. Capt Kidd (q.v.) was executed here. Judge Jeffreys was arrested at W. when trying to escape. The Thames Tunnel, constructed 1824-43, connects with Rotherhithe.

War, Civil, see CIVIL WAR.

War, Great, see WORLD WAR, FIRST.

War, Second World, see WORLD WAR, SECOND.

War and Warfare. War may be defined as 'the state or condition of governments contending by force' (Westlake), and in ascertaining whether such a state or condition exists, the intention of the parties or either of them must be regarded. The mere commission of certain acts of force, hostility, or unfriendliness is not sufficient, there being, for instance, certain acts war-like in their essence but traditionally held to fall short of war, to which a nation may resort when provoked under circumstances of too little moment to call for a declaration of war. It is always open to the Power affected by such acts to treat their commission as an act of war, but if it does not elect to do so, the peace is deemed to remain unbroken. The most familiar among these acts of forcible redress short of war are retorsions (q.v.), reprisals (q.v.), and pacific blockade (i.e. a blockade that leaves third Powers free to enter and leave the blockaded ports at pleasure). For a considerable time it was held, though

not unanimously, to be necessary that the outbreak of war should be preceded by a solemn declaration. This theory was very frequently disregarded in practice, there being either no declaration at all or a declaration at some date after the first act of hostility. It became, however, customary in the latter part of the 19th cent. to issue a manifesto announcing the outbreak of war, and present practice is founded on the third Hague Convention drawn up at the Peace Conference in 1907, the Powers recognising 'that hostilities between them must not commence without a previous and explicit warning in the form of either a declaration of war, giving reasons, or an ultimatum with a conditional declaration of war.' A war may be brought to an end in 3 ways: (1) by the reciprocal intermission of hostilities without any definite understanding being arrived at between the belligerents; (2) by the conquest and subjugation of one of the belligerents by the other; (3) by a bilateral arrangement embodied in a treaty of peace, whether the honours of war be equal or unequal.

For warfare see (*inter alia*) AERIAL WARFARE; ARMS; ARMY; BELLIGERENTS, RIGHTS AND DUTIES OF; BLOCKADE; CHEMICAL WARFARE; CRIMES, WAR; JUNGLE WARFARE; NAVY AND NAVIES; PRISONERS OF WAR; RED CROSS; STRATEGY AND TACTICS; various wars, historic battles, and weapons of war, are treated in separate articles.

War Communism, name given to the economic and social policy of the Bolshevik Gov. in Russia in 1918-21. This policy had the dual aim of serving the Bolshevik effort in the civil war and of effecting the transition to Communist conditions: it included nationalisation of industry and trade, compulsory food deliveries by peasants, wages in kind for workers and employees, compulsory labour service by the bourgeoisie, etc. All this led to widespread discontent and sev. uprisings in 1921 (see ANTONOV; KRONSTADT); as a result the New Economic Policy (q.v.) was introduced.

See M. Dobb, *Soviet Economic Development since 1917* 1948; H. Schwartz, *Russia's Soviet Economy*, 1951.

War Crimes, see CRIMES, WAR; INTERNATIONAL LAW, *International Law and War Crimes*; NUREMBERG TRIAL.

War Debts, see DEBTS, INTER-ALLIED.

War Decorations, see DECORATIONS FOR WAR SERVICES.

War Department of the U.S.A. (since 1947 the Department of the Army), was created by Act of Congress in 1789, succeeding a similar dept which was estab. prior to the adoption of the Constitution. Subsequent Acts and executive orders have greatly altered the scope and functions of the dept since its inception, as it originally encompassed many activities later delegated to the Navy and Interior Depts. The National Security Act of 1947 transferred the dept to the newly created National Military Establishment (since 1949 the Dept of Defence) and redesignated it the Dept of the Army. The Secretary of War assumed the title

Secretary of the Army. The dept is charged with responsibility for organising, training, maintaining, and equipping the U.S. Army, and is housed in the Pentagon (q.v.). For the administration of the Navy see NAVY DEPARTMENT OF THE U.S.A. A separate Dept of the Air Force was first set up in 1947.

War Graves. The enormous casualties of the First World War brought into prominence the question of burial and of the upkeep of the graves of the dead. In the case of the Brit. Empire it was agreed at the Imperial Conference (q.v.) of 1918 that such graves should be maintained permanently. To deal with the matter the Imperial W. G. Commission was constituted, which consists of the secretaries of state for war and the colonies, the minister of works, the high commissioners of Canada, Australia, New Zealand, S. Africa, India, and Pakistan, and various other persons. The Duke of Gloucester is president and the secretary of state for war the chairman. In every battlefield of the First World War proper cemeteries have been made and headstones and other means of identification provided. Areas have been searched for the 'missing', their identity estab., and proper burial carried out. The discovery of Brit. bodies by local inhab. on the former battlefields continued up to the outbreak of the Second World War (1939), but in the year 1938-9 the number was much less than in previous years. Visits to the cemeteries have been organised by voluntary associations, particularly on the occasion of the unveiling of a general memorial. Much detail may be obtained from the ann. reports of the commission, whose permanent H.Q. are now situated at Woodburn Green, near High Wycombe, Buckinghamshire. By fostering the remembrance in common of the dead of the First World War the commission were persuaded that they might make a practical, as well as a sentimental and emotional, contribution to the maintenance of peace. But while the commission were still finding on the battlefields of the First World War, and giving burial to, the remains of men who had given their lives 'to end war' they were called upon to prepare for a new harvest of death, and to protect the very memorials visibly recording the sacrifice of the past from the effects of a fresh outbreak of violence. In 1938, following a visit by members of the 'Anglo-Ger.-Fr. mixed committee' to England, an informal agreement was reached under which Great Britain and Germany reciprocally assured the care of enemy graves during the subsequent hostilities. By agreement with the participating govts. the powers bestowed on the commission by the original charter and supplemental charters have been extended to cover the commemoration of the dead of the Second World War. So swift was the allied advance in N. France in 1944 that the tide of battle swept past the Brit. war cemeteries and memorials of the First World War and left them for the most part unsathed. As France and Belgium were liberated, it was found that the cemeteries

had, on the whole, been respected by friend and foe alike. At Cologne the Brit. cemetery was found to be in good condition (1945). Of the great memorials, the Menin Gate suffered rather more damage than had been expected, though largely on the surface, but name panels were found damaged and the bronze gates had been removed. Much remains to be done to bring the cemeteries to their former standard; but fortunately the commission is in a strong financial position, with an endowment fund of nearly £6m. Cemeteries and memorials of the

cemeteries, and many of the larger service plots in municipal cemeteries, have developed in such a way as may render some of them places of pilgrimage no less beautiful in their horticultural and architectural features than the cemeteries of the last war overseas. Wooden crosses and other markers, later to be replaced by permanent headstones, are wherever possible set in narrow flower borders between stretches of level turf. At Brookwood are special plots for Fr., Belgian, Czechoslovak, and Polish dead, and similarly for the Canadian dead from the Dieppe raid.



Imperial War Graves Commission

THE BRITISH MILITARY CEMETERY AT ROME, ITALY

This cemetery contains 429 British Commonwealth graves of the Second World War.

First World War in many other parts of the world have been maintained at a high standard. For the commemoration of the dead of the commonwealth and empire in the Second World War arrangements were made for taking over recorded graves as soon as conditions allowed. First cemeteries in N. Africa to be constructed are those at Sollum and Acroma, designed by Sir Hubert Worthington, first of the commission's prin. architects appointed for Second World War cemeteries. As in other foreign countries, the Egyptian Gov. expressed willingness to provide the requisite land for the new cemeteries. A local chieftain in Eritrea gave the site of the Brit. cemetery at Koron. Numerous sites and lay-outs S. of Rome were prepared for Brit. graves in Italy. Under the guidance of Sir Edward Maufe, whom the commission appointed its prin. architect in the U.K., the R.A.F. regional

Out of a tota of about 350,000 graves scattered throughout the world, by 1955 some 220,919 Brit. (U.K.) W. G. out of a total Commonwealth figure of 318,672 had been taken over from the Army by the W. G. Commission. Approximately 40,000 of these are located in Italy. They are divided among 42 cemeteries, stretching from Sicily to the foothills of the Alps. Their size varies: the large necropolis at Cassino contains over 4000 graves; others such as Padua, a few hundred. The pilgrim will naturally see the close connection between the progress of allied military operations in 1943-4 and the cemetery sites. They lie in most cases near or on the spot where many actions for the liberation of Italy were fought. Sicily has 3 concentrations—Agrig, Catania, and Syracuse. The cemetery at Cassino is set in a tremendous natural amphitheatre. Of all these moving burial

areas in Italy none is more serene than that at Assisi, near to the churches and monastery rich in memories of the saint who perhaps more than any other is dear to the Eng. race. The commission have made it their particular concern to blend the lay-out of the cemeteries with the natural beauty and architectural character of their environment. The general treatment of the sites is uniform, and on the lines adopted for the graves of the First World War. The effect aimed at is that of an Eng. garden rather than that of the local *campi santi*, and headstones take the place of crosses. The central features are again the great Cross of Sacrifice designed by Sir Reginald Blomfield and the Stone of Remembrance, by Sir Edwin Lutyens, serving to underline the fact that here is ground 'that is for ever England.' Among cemeteries in the Pacific area the sites of 3 are of outstanding interest and beauty: Bita Paka, 32 m. from Rabaul, with 2800 burials; Ambon, overlooking Amboina Bay, with 2000 burials; and Makassar, with 600 burials, mostly U.K. sailors and marines who were prisoners of war in Celebes. See *Their Name Liveth* (issued by the Imperial War Graves Commission, 1954-).

War in Korea (1950-53), see KOREAN WAR.

War Loan, see PUBLIC DEBT.

War Medal, British: 1. Issued in July 1919 to record the successful conclusion of the First World War, and awarded to all officers and men of the Brit., Dominion, Colonial, and Indian Forces, members of women's formations enrolled for service with the Forces and members of military hospitals and kindred organisations, who either entered a theatre of war on duty or who left their places of residence and rendered approved service overseas between 5 Aug. 1914 and 11 Nov. 1918 inclusive. The medal is in silver for all except Brit. subjects enrolled in native labour corps units, for whom the medal is cast in bronze. The ribbon has an orange centre, watered with stripes of white and black on each side with borders of royal blue. The winning design was that of Wm McMillan, a young Scottish sculptor, who also won the prize for the best design for the Victory Medal (q.v.).

2. Instituted in 1948 for service in the Second World War. The obverse of the cupro-nickel medal bears the royal effigy, crowned, and the reverse, designed and modelled by E. Carter Preston, shows a lion standing triumphant on the body of a double-headed dragon, the two heads, an eagle's and a dragon's, signifying respectively the prin. occidental and oriental enemies in the Second World War. The medal is 1.42 in. in diameter. The ribbon has stripes of red, white, and blue.

War Office, the H.Q. of the Brit. Army, situated in Whitehall, London. The dept during the early years of the present cent. was thoroughly overhauled and its organisation revised on the recommendation of a specially appointed committee over which Lord Esber presided. An Army Council was formed which consisted

of the secretary and under-secretary for war, together with the financial secretary and 4 military members (chief of the imperial general staff, adjutant-general to the forces, quarter-master general to the forces, and master general of the ordnance). The present composition of the council includes the vice-chief and the deputy chief of the imperial general staff and the permanent under-secretary of state for war (secretary of the council), and omits the master general of the ordnance. Each of the military members has some special dept of the military service to superintend. The vice-chief is responsible, broadly speaking, for operations, while the deputy chief is responsible for Army organisation policy; and they are responsible directly to the secretary of state for war, who is, of course, directly responsible to Parliament. The inspector-general of the forces, who took the place of the former commander-in-chief, carried out the plans of the Army Council and reported upon the efficiency of the men and the utility of the reforms; this post has now been abolished, and the duties allocated to a director of military training, with subordinate directors to assist.

The beginning of the present W. O. is to be found in the appointment of a 'clerk to the general' in Charles II's days. The expressions 'secretary to the forces' and 'secretary to the council of war' were also current, and appear to have developed into the 'secretary-at-war.' This official was in the nature of a private secretary to the commander-in-chief, but the office grew in importance, and considerable administrative duties were attached to it. The Ordnance Board (q.v.), which long antedated the W. O., was abolished in 1855. Its functions, which included the supply of arms and equipment, were merged with those of the W. O. In 1939 many of the duties taken over by the W. O. in 1855 passed to the newly formed Ministry of Supply. The executive head of the W. O. is the Army Council, presided over by the secretary of state for war.

See H. Gordon, *The War Office*, 1935.

War Shock, see PSYCHONEUROSIS; PSYCHOPATHOLOGY; SHELL-SHOCK; INSANITY.

Warbeck, Perkin (c. 1474-99), pretender to the Eng. throne in the reign of Henry VII. He was a native of Tournai, and appeared in 1490 at the Burgundian court as the younger of the 2 princes whom Richard III was said to have murdered in the Tower of London. He was acknowledged as her nephew by Margaret of Burgundy (q.v.), and received at the Court of the Fr. king. W. went to Scotland, where he was received by James IV. In 1498 he invaded the SW. of England, and besieged Exeter, but was captured and brought to the Tower. The following year he escaped, but was recaptured and executed at Tyburn.

Warblers, or *Sylviidae*, family of passerine birds distinguished from the thrushes by their more delicate structure and more subulate bill. They include

some of the choicest songsters. Among the numerous Brit. W.s are chaff (Phylloscopus collybita), the garden W. (Sylvia salicaria), the lesser whitethroat (Sylvia curruca), the grasshopper W. (Acrocephalus naevius), the Dartford W. (Melmophilus undatus), the reed W. (A. streperus), and the sedge W. (A. phragmites).

Warburg, Otto Heinrich (1883-), Ger. physiological chemist. b. Freiburg im Breisgau, studied chemistry under Emil Fischer. He became a prof. at the Univ. of Berlin, and at the Kaiser Wilhelm Institute of cellular physiology. He worked on the chemistry of the living cell, and on the principles of metabolism, and made important discoveries about fermentation, breathing, and the assimilation of carbonic acid. In 1931 he received the Nobel prize for chemistry.

Warburton, William (1698-1779), prelate and editor, b. Newark. Educ. at Oakham Grammar School, Rutland, he took orders, became chaplain to Frederick, Prince of Wales, and was appointed dean of Bristol in 1757 and Bishop of Gloucester in 1759. He was a friend of Pope, who made W. his literary executor, and he brought out an ed. of Pope's works in 1751. He also pub. an ed. of Shakespeare which was severely criticised. See life by J. S. Watson, 1863; and A. W. Evans, *Warburton and the Warburtonians*, 1932.

Ward, Artemus, see BROWNE, C. F.

Ward, Ebenezer (1819-1902) and **Lock, George** (1832-91), joint founders, 1854, of the firm of publishers which still flourishes under their names. Among their first pub. were popularly priced editions of Webster's *Dictionary* and Homer's *Odyssey*, illustrated by John Flaxman. Ward, Lock also pub. the *Windsor Magazine*. The House received a temporary setback when its premises were completely gutted during the Blitz, 1940.

Ward, James (1769-1859), painter and engraver, b. London. In 1791 he was appointed painter and mezzotint engraver to the Prince of Wales, and in 1807 became A.R.A., and in 1811 R.A. In his animal studies he was influenced by his brother-in-law, George Morland, but his aims were more ambitious. His large landscape 'Gordale Scar' (Tate Gallery), though falling short of greatness, is remarkable in its romantic energy.

Ward, John Quincy Adams (1830-1910), Amer. sculptor, b. Urbana, Ohio. From 1850 to 1856 he studied under H. K. Brown, assisting him with the equestrian statue of Washington in Union Square, New York. In 1863 his 'Indian Hunter' was erected in Central Park, where also are his 'Frederick' and 'Shakespeare.' He executed the colossal statue of Washington for the Treasury Buildings.

Ward, Sir Joseph George (1856-1930), New Zealand statesman, b. Melbourne. He was postmaster-general and colonial secretary, 1899-1906. Prime Minister 1906-12; he represented New Zealand at the Imperial Conferences in London, 1907, 1909, and 1911. He was created a baronet in 1911. He was again Prime Minister, Dec. 1928-May 1930.

Ward, Sir Leslie (1851-1922), artist, b. London, known by his pseudonym 'Spy.' He became famous as a caricaturist for *Vanity Fair* (1873-1909), among his most characteristic drawings being those of lawyers. He was knighted in 1922. He wrote *Forty Years of Spy*, 1915.

Ward, Mary Augusta (1851-1920), Brit. novelist better known as Mrs Humphry Ward, b. Hobart, a grand-daughter of Dr Arnold of Rugby and niece of Matthew Arnold. She went to school in England, settled at Oxford, and in 1872 married T. Humphry Ward, a Fellow of Brasenose, who later joined the staff of *The Times*. She is best known by her novel *Robert Elsmere*, 1888, an attack on evangelical Christianity which caused a great sensation. It was followed by *David Grieve*, 1892, and a succession of serious and humourless novels which were popular for a time. Her autobiography, *A Writer's Recollections*, appeared in 1918. See lives by S. Gwynn, 1917, and J. P. Trevelyan, 1923.

Ward, William George (1812-82), Rom. Catholic philosopher and theologian; educ. at Winchester and Lincoln College, Oxford, fellow of Balliol 1834-45. He was ordained priest in the Church of England, 1840 and thereafter led a movement advocating reunion with Rome. In 1841 he wrote in defence of Newman's Tract XC, and in 1844 pub. *Ideal of a Christian Church*, maintaining that the Church of England had no future but in submission to the Holy Sec. Deprived of his fellowship and of his degree, W. was received into the Rom. Catholic Church in 1845. From 1851 to 1858 he was lecturer in moral philosophy at St Edmund's College, Ware, and was granted a doctorate of philosophy by Pius IX (1854). From 1863 to 1878 he edited *The Dublin Review*, in which he upheld the doctrine of papal infallibility (proclaimed in 1870). See his *Essays in the Philosophy of Theism* (ed. W. P. Ward, his son), 2 vols., 1884. See also W. P. Ward, *William George Ward and the Oxford Movement*, 1889, *William George Ward and the Catholic Revival*, 1912.

Ward: 1. In Eng. law, a minor who has been legally placed under the care of a guardian (q.v.).

2. Electoral div. of a parl. or municipal bor.

Warden, in England, officer appointed for the naval or military protection of some particular dist. The W. of the Cinque Ports (q.v.) was created by Wm the Conqueror with extensive jurisdiction over the adjacent coast land. The W.s of the marches were appointed to protect the boundaries between England and Scotland or Wales. It is the title of the heads of some univ. colleges.

Wardha, tn of Madhya Pradesh state, India, known mainly because it was for many years the place where Gandhi (q.v.) lived and had his main ashram.

Wardmote, in the city of London an ann. court or meeting held in each ward of the city under the presidency of the alderman. Its powers, which formerly extended to matters concerning the

watch, the police, etc., are now merely nominal. The common councillors of the city are elected at the W.

Wardroom, originally, in the days of wooden warships, the big cabin in the after part underneath the capt.'s apartments. The term dates from about 1750, the W. being used as a lieutenants' mess, where they also slept. The name is supposed to be derived from 'wardrobe' as the place where officers kept their clothes before they had a communal mess. In modern times the wardroom became the mess in men-of-war for officers of all branches of and above the rank of lieutenant, but in 1949 Branch (former Warrant) officers were also admitted to the wardroom.

Wardship, in feudal times, an incident of tenure by knight service. This right gave the lord the guardianship in chivalry of the heirs (males under 21 and females under 14) of his tenants, and with such guardianship the right to the lands of the heir, without having to account for the profits, until the heir came of age. Abolished under the Commonwealth.

Ware, urb. dist. of Herts, England, on the Lea, 2 m. N.E. of Hertford. It has manufacturing chemists, malting, plastics, engineering, stationery, coach-building, glove-making, and numerous other small industries. 'The Great Bed of W.' once at the 'Saracen's Head,' is now in the Victoria and Albert Museum in London. Pop. 8500.

Wareham, municipal bor. and mrkt tn of Dorset, England, on the Frome, near Poole Harbour, 15 m. E. of Dorchester. It has remains of a Brit. earthwork. The church of St Mary contains the coffin of King Edward the Martyr. W. was a medieval port of some importance. Stone, clay, and lime are worked. Pop. 3000.

Warham, William (c. 1450-1532), prelate, a native of Hants, educ. at Winchester and New College, Oxford, of which he became a fellow, 1475. He was recognised as a legal expert, and between 1490 and 1502 was employed on sev. important gov. missions abroad. In 1502 he became Bishop of London, and was translated to Canterbury 2 years later. W. was lord keeper, 1502-4, and lord chancellor, 1504-15, when he was ousted by Wolsey (q.v.). He was chancellor of Oxford Univ., 1506-32. W. had the confidence of Henry VII, and he retained the royal confidence under Henry VIII until Wolsey supplanted him, not only as chancellor but also as prin. royal adviser. By the time Henry raised the project of the annulment of his marriage with Catherine of Aragon (q.v.), W. was an old man. Though always regarded as a 'king's man,' and known for his conscientiousness over detail rather than for his spiritual ardour, W. opposed the annulment. Eventually, however, Henry VIII forced him to advise the Pope to grant it. But though compliant in this instance, W. protested shortly before his death against the measures taken by Parliament since 1529 in defiance of papal authority. At this

stage his words carried little weight. His death enabled the king to appoint Cranmer to the primacy at a moment highly convenient to the king and to the Eng. Reformation. W.'s library was bequeathed to Winchester College, and to New College and All Souls College, Oxford.

Warkworth, small tn of Northumberland, England, on the Coquet, 1 m. from the N. Sea. The ruins of W. castle and W. hermitage (mentioned in Percy's *Reliques*) are near by. Pop. 917.

Warlock, Peter (pen-name of Philip Heseltine) (1894-1930), musical scholar and composer, b. London. He studied under Colin Taylor at Eton and was influenced by Delius and Bernard van Dieren. He founded the *Sackbut* in 1920 and ed. it for a year. He wrote a book on Delius, 1923, another on Gesualdo (with Cecil Gray), 1926, and a small but very learned work on *The English Ayre*, 1926. He was also a scholarly editor of old Eng. music. Compositions include: *An Old Song*; *The Cuckoo*; a song-cycle (a Carnegie award, 1923); *Sauvages*; *Peterisms*; *Corpus Christi*; and numerous separate songs (over 100 published), which are among the best produced in England at any time. See memoir by C. Gray, 1934; H. Foss, *British Music of our Time*, 1946.

Warmia, see ERMELAND.

Warminster, tn of Wilts, England, at the SW. extremity of Salisbury Plain, midway between Bath and Salisbury. It has an early 14th-cent. church, the theological college of St Boniface, and an 18th-cent. grammar school. Longleat House and Park is 5 m. SW., and Shearwater 2 m. S. W. is an army training centre and workshop depôt. Silk, gloves, and agric. machinery are produced, and there is an anc. mrkt. Pop. 8236.

Warne, Frederick (1825-1901), founder, 1865, of the Brit. publishing firm that still bears his name.

Warnefridus, see PAUL THE DEACON.

Warnemünde, Ger. seaport in the dist. of Rostock, on the Mecklenburg bay of the Baltic Sea, at the mouth of the Warnow R., 7 m. NNW. of Rostock (q.v.), for which it is the outport. It is a seaside resort, and has a train ferry to Denmark.

Warner, Sir Pelham Francis (1873-), barrister, cricketer, and writer, b. Port of Spain, youngest son of Charles Wm W., sometime Attorney-General of Trinidad. He was educ. at Rugby School, and Oriel College, Oxford. Played for Middx 1894-1920 (captain 1908-20), and captained M.C.C. teams to Australia (1903-4 and 1911-12), S. Africa (1905-6), and S. America (1926-7); also toured N. America, New Zealand, Portugal, Holland, and Denmark. He made nearly 29,000 runs in first-class cricket. Joint-manager M.C.C. team in Australia, 1932-3; Chairman of the Selection Committee, various years; President M.C.C., 1950. Knighted 1937; M.B.E. His numerous books include *Lord's 1787-1945*, 1946, and *Long Innings*, 1951 (his autobiography). Ed. *The Cricketer* (periodical) since 1921; *Imperial Cricket*, 1912.

Warner, Susan Bogert (1819-85), Amer. novelist who wrote under the name Elizabeth Wetherell, b. New York City. Her emotional novel *The Wide, Wide World*, 1850, had immense popularity, though it contains hardly any incidents. *Queechy*, 1852, was also a success, and was followed by sev. other similar stories of gentle piety. See life by A. B. Warner, 1910.

Warner, Sylvia Townsend (1893-), novelist and poetess, b. Harrow, Middx. A graceful and inconsequent fancy appears in her books of verse, *The Espalier*, 1925, *Time Importuned*, 1928, *Opus 7*, 1931, and *Rainbow*, 1932. Of similar type are her novels *Lolly Willowes*, 1926, *Mr Fortune's Margot*, 1927, *The True Heart*, 1929, *Summer Will Show*, 1936, *The Corner That Held Them*, 1948, and *The Flint Anchor*, 1954. *A Garland of Straw*, 1943, and *Museum of Cheats*, 1947, are vols. of short stories.

Warner, William (1558-1609), poet, b. London. Educ. at Oxford, he became an attorney. His chief work was a metrical history, *Albion's England*, 1586, which ran to about 10,000 lines and had a great vogue in Elizabethan times, W. and Spenser being called the Homer and Virgil of the age.

Warner Brothers' Pictures, Amer. film-making organisation. The company's studios of 140 ac. are in Burbank, California. In 1903 the late Sam Warner with his brothers Harry M., Jack L., and Albert, started to show films in a converted shop. In 1912, when they had acquired 5 theatres, they decided that the best way to secure a sufficient supply of films was to make them. They were pioneers in the field of 'talkies,' making 'The Jazz Singer' and the 'Lights of New York.'

Warnsdorf, see VARNSDORF.

Warrandice, in Scots law, the obligation by which a party conveying a subject or right is bound to indemnify the grantee, disponee, or receiver of the right, in case of eviction, or of real claims or burdens being made effectual against the subject, arising out of obligations or transactions antecedent to the date of the conveyance. W. is either *personal* or *real*. *Personal W.* is that by which the grantor and his heirs are bound personally. *Real W.* was that by which certain lands, called warrandice lands, were made over eventually in the security of the lands conveyed: it is no longer competent. Though the term 'covenant' is unknown to Scots law, its place is to some extent filled by the doctrines of the W.

Warrant, instrument authorising one to do something which otherwise he has no right to do. In England a police W. is issued by a justice on a written and sworn information of an offence; it is addressed to the constables of his dist., specifies the offence, describes the person accused, and commands the police to arrest him and bring him before justices to answer the charge. It remains in force until executed, and if the criminal escapes into another dist. the W. can be 'backed' by endorsement of the justices of such dist.,

so to be enforceable against the criminal in such dist. A general W. (i.e. one which purports to authorise the arrest of unnamed persons without previous evidence of their guilt or knowledge of their persons) to seize suspected persons and a general search W. empowering messengers to seize documents are alike illegal. The term W. is also used for documents authorising the payment of dividends or the delivery of goods out of bond. A distress W. is one that authorises the sheriff's officer to seize goods for arrears of rent.

Warrant of Attorney, written instrument executed by one person authorising another to confess judgment against him in an action for a certain named amount. It is often given by way of security by a prospective debtor and enables the creditor to obtain judgment against the debtor without the delay and expense of an action.

Warrant Officers, see RANK.

Warranty. In Eng. law a W. within the meaning of the Sale of Goods Act, 1893, is an agreement for the sale of goods, the breach of which gives a right to sue for damages, but not to reject the goods or treat the contract as repudiated. A representation made by the seller at the time of sale will only amount to a W. if made with that intention, and the test of such intention is to determine whether the seller purported to assert a fact of which the buyer was ignorant. If not, then there is no W. A general W. does not give a right to sue in respect of defects obvious to both parties, but in this respect it is to be observed that a purchaser is not bound to use extreme diligence in finding defects.

Warren, Earl (1891-), Amer. politician, governor, and supreme court justice, b. Los Angeles, California, and graduated from the Univ. of California law school, 1912. He was admitted to the bar, 1914, and practised law in Oakland, California, and served the local gov. in various capacities. W. was attorney-general of California, 1939-43, and twice elected governor, in 1942 and 1946. He was vice-presidential candidate on the Republican ticket in 1948, but was defeated along with Thomas E. Dewey, the Presidential candidate. W. was appointed Chief Justice of the U.S. Supreme Court, taking office 5 Oct. 1953.

Warren, Joseph (1741-75), Amer. patriot b. Roxbury Massachusetts. He graduated at Harvard in 1759 and studied medicine at Boston. In 1774 he drafted the 'Suffolk Resolves' which urged the use of force against Great Britain if necessary. W. was a member of the First, Second, and Third Provincial Congresses (1774-75) and was president of the Third. He took part as a volunteer in the Battle of Bunker Hill (q.v.), where he was killed.

Warren, Leicester, see DE TABLEY.

Warren, Robert Penn (1905-), Amer. poet, novelist, and critic, b. Guthrie, Kentucky. Educ. at Vanderbilt Univ. and Yale, he went to Oxford as a Rhodes Scholar. He was appointed prof. of

English at Louisiana State Univ. in 1934, and at the univ. of Minnesota in 1942, when he also received the Shelley Memorial Prize for Poetry. His vols. of verse, which are partly in the 'metaphysical' tradition, include *XXXVI Poems*, 1935, *Eleven Poems on the Same Theme*, 1942, and *Brother to Dragons*, 1953. In 1946 his novel *All the King's Horses* was awarded the Pulitzer Prize; others are *Night Rider*, 1938, *At Heaven's Gate*, 1943, and *World Enough and Time*, 1950; *The Circus in the Attic*, 1948, is a vol. of short stories.

Warren: 1. City, co. seat of Trumbull co., NE. Ohio, on Mahoning R. 53 m. SE. of Cleveland. It manufs. machinery, electric appliances, and automobile parts, and has steel mills. Pop. 49,900.

2. Co. seat of W. co., Pennsylvania, U.S.A., on the Conewango and Allegheny Rs., 49 m. ESE. of Erie. Oil and natural gas abound, iron-ore and petroleum are found. W. has oil refineries, iron and chemical works, foundries, silk, woolen, and flour mills, and manufs. furniture. It is named after the Amer. patriot, Joseph W. (q.v.) Pop. 14,849.

Warren, enclosure made for the breeding of rabbits. The term W. also denotes a fish or game preserve.

Warrenpoint, seaside resort of co. Down, N. Ireland, on the N. shore of Carlingford Lough, a centre for the Mourne Mts. Pop. 2800.

Warringham, metropolitan shire of Sydney in Cumberland co., New S. Wales, Australia, situated on the NE. boundary of the metropolis. It has a number of fine surfing beaches. Pop. 64,830.

Warrington, municipal and parl. bor. of Lancs, England, on the Mersey, 16 m. from Liverpool and Manchester. It is on the Manchester Ship Canal below the Latchford locks, and has access to that canal, as well as to the R. Mersey, and the Sankey and Bridgewater canals. It is near both the Lancs coalfield and the Mersey chemical area, and its position is reflected in its various industries. W. played a prominent part in the rise of nonconformity in the 17th cent. An interesting building is the one-time Old Academy opened in 1757 as a home of intellectual culture for Lancs generally. A circulating library, founded in 1760, became the nucleus of the first municipal rate-supported public library in Great Britain, 1848.

In Rom. times W. was a place of considerable strategic value, the ford over the Mersey at this point being for cents. the prin. connecting link between N. and S. and to guard the ford the Rom. station *Veratunum* was estab. W. by the name of *Walintune*, appears in Domesday Book.

In the Middle Ages W. was one of the prin. centres in the country for linen, flax, and hemp, and its armourers founded its present reputation for files and tools. In the 18th cent. wire-drawing, ship-building, sailmaking, the making of clocks and watches, and brewing estab. the growing in to meet the struggles of the industrial revolution. The chief

groups of industries in W. to-day are metals manuf., including, especially, wire of all varieties, tool-making, engineering products of all kinds, gas appliances; leather; soap, chemicals, and glycerine; glues and gelatines; seeds; aluminium; and brewing. Pop. 80,250.

Warriston, Lord, see JOHNSTON, ARCHIBALD.

Warrnambool, seaport of Villiers co., Victoria, Australia, on Lady Bay, 50 m. from Portland. It has a fine harbour, and a lighthouse on the N. shore of the bay. There are freestone quarries. Pop. 9900.

Wars of the Cross, see CRUSADES.

Wars of the Roses, see ROSES, WARS OF THE.

Warsaw (Polish *Warszawa*): 1. Prov. (*województwo*) of E. central Poland. It is generally low-lying and fertile, and is well-wooded. It is drained by the Vistula, Bug (q.v.), Narew, and Pilica Rs. Live-stock is raised, and cereals, potatoes, flax, and sugar-beet are grown. Area 10,871 sq. m.

2. (Russian *Varshava*; Ger. *Warschau*; Fr. *Varsovie*) Cap. city of Poland, in the E. central part of the country. It is also cap. of the prov. of W., but itself ranks as a prov. It stands on both banks of the Vistula, and has road and rail communications with Moscow, Kiev, Leningrad, Prague, and Berlin, as well as with cities of W. Europe. It grew up around a castle of the Dukes of Mazowsee, and became, in the 15th cent., the cap. of the duchy. In 1595 it succeeded Cracow (q.v.) as cap. of Poland. It was taken by the Swedes in 1655, 1656, and 1702, and by the Russians in 1792 and 1794. In 1795 it went to Prussia. Napoleon made it the cap. of a grand duchy. It was taken by the Russians in 1813, and was ceded to them by the Congress of Vienna (q.v.). In 1830 it was the centre of a rebellion against Russian rule. In 1919 it became the cap. of the Polish rep., and in the following year it was defended by Marshal Weygand (q.v.) against the Russians. In 1926 it was the scene of Pilsudski's (q.v.) *coup d'état*. During the Second World War W. fell to the Germans on 27 Sept. 1939. There was a Jewish rising in the city in Feb. 1943, after which the surviving Jews were massacred. In Aug. 1944 the Polish resistance movement in the city rose against the Germans, and was subdued only after a heroic battle of 63 days' duration; throughout this period the Russian Army was in possession of the E. bank of the Vistula, but refused assistance to the Polish fighters on the opposite bank (see EASTERN FRONT or RUSSO-GERMAN CAMPAIGNS IN SECOND WORLD WAR). When the Russians finally took the city in Jan. 1945, 87 per cent of its buildings were in ruins. Immediately after the end of war the rebuilding of W. began. Whereas the old city grew concentrically round the citadel on the escarpment above the riv., the new W. is built on the axis of a great E.-W. highway, which passes under the Old Tn (*Stare Miasto*) by means of a tunnel. A N.-S. highway connects the N. suburb of Żoliborz with the S. suburb

of Mokotow. In general lay-out the city consists of a series of stripes running N. and S., with gov. buildings along the riverside escarpment, and the shopping, entertainment, and commercial centres to the W. There are sev. bridges across the Vistula, connecting the main part of the city with Praga, the dist. on the E. bank.

W. is the seat of an archbishop, and has a univ. (1818) and many other educational institutes. There is an airport at Okęcie (SW.) and a radio station at Raszyn (SW.). There are metalworking, textile, chemical, engineering (electrical goods, precision instruments, motor cars), foodstuff, printing, and publishing industries. Pop. 996,000.

Warsop, tn of Notts, England, 5 m. from Mansfield, on the Meden. The prin. industry is coal mining. The tn has a 13th-cent. church. Pop. 11,330.

Wart, or **Verruca**, excrescence caused by excessive growth of the tissues of the papillae of the skin (see SKIN). Little is known of the manner in which W.s are formed, and they usually appear and disappear without any apparent cause, especially in the young. In some cases the cause seems to be infection by a virus. They are very vascular, and are covered with some thickness of scaly epidermis, which easily becomes rubbed off. In children, plantar warts (i.e. verrucas on the soles of the feet) may be painful on walking, and, since they are very infectious, schools, etc., always insist on treatment at once.

Wart Hog, genus of African pigs (*Phacochoerus*) with 2 species. Resembling the wild boar, it is distinguished by the large head, 4 large tusks, and at each side of the face large, wart-like pads. Both species (*P. aethiopicus*, found in the SE. regions, and *P. africanus* found over most of Africa) have a mane of bristly hair on neck and back.

Warta (Ger. **Warthe**), riv. of Poland, which rises about 30 m. NW. of Cracow, and flows in a general NNW. direction, past Poznań, to join the Oder (q.v.) at Kostrzyn. Its chief tribs. are the Noteć and the Prośna. It is connected by canal with the Vistula (q.v.). Length 492 m.

Warthe, see **WARTA**.

Watson, Joseph (1722-1800), poet and critic, b. Dunsfold, Surrey, son of Thomas W., vicar of Basingstoke and Prof. of Poetry at Oxford. Joseph was educ. at Winchester and Oxford, took orders, and became headmaster of Winchester, and prebendary of Winchester and of St Paul's. His 2 vols. of *Odes*, 1744-6, represented a revolt against neo-classical correctness, and with his *Essay on the Writings and Genius of Pope*, 1757-82, gave an impulse to the coming Romantic Movement. See E. H. Partridge, *The Three Watsons*, 1927.

Watson, Thomas (1728-90). Poet Laureate, b. Basingstoke, brother of Joseph W. (q.v.). He was educ. at Trinity College, Oxford, of which he became a Fellow, remaining there all his life. After publishing sev. poetical works, including *The Pleasures of Melancholy*, 1747, and

The Triumph of Isis, 1749, he enhanced his reputation by his *Observations on Spenser's Faerie Queene*, 1754. Between 1774 and 1781 he pub. his great *History of English Poetry*, which comes down to the end of the Elizabethan age. He was appointed Poet Laureate in 1785, and in the same year Camden Prof. of History, and was one of the first to detect Chatterton's forgeries. See E. Gosse, *Two Pioneers of Romanticism*, 1915; and life by C. Rinkar, 1916.

Warville, Jean Pierre Brissot de, see **BRISSEOT**.

Warwick, Guy of, see **GUY OF WARWICK**.
Warwick, Richard Neville, Earl of (1428-71), 'the king-maker'. He was the eldest son of the Earl of Salisbury, and married the daughter and heiress of the Earl of Warwick, succeeding to the title in 1449. He was the most active and influential of all the supporters of the Yorkist house. For the first 3 years of Edward IV's reign W. was the real ruler of England, but after Edward's marriage to Elizabeth Woodville and the advancement of the queen's relations, W. and Edward quarrelled. W. went over to the Lancastrians, but was killed at the battle of Barnet in 1471. W.'s title of 'king-maker' does not seem to have been used until half a cent. after his death. Throughout his life, W.'s actions were dictated solely by personal ambition. He was interested only in increasing the power of his own family, even at the expense of national stability. But he had dynamic energy, personal courage, and considerable diplomatic and military skill. See **ROSES**, **WARS OF THE**. See C. Oman, *Warwick the Kingmaker* (2nd ed.), 1903.

Warwick: 1. Mkt. tn, municipal bor., and co. tn of Warwickshire, England, on the R. Avon, 21 m. SE. of Birmingham. It has been suggested that the name of the tn derives from the O.E. 'wering wic,' meaning 'dwellings by the weir.' The story of W. is closely linked with that of its castle, which stands on a site fortified since Saxon times; the main castle gateway and towers date back to the 14th cent., and are among the finest examples of the military architecture of that time. W. grammar school claims its descent from a school possibly going back to the reign of Edward the Confessor, which is first mentioned in a charter of Henry I. In the church of St Mary is the famous 15th-cent. Beauchamp Chapel, and the fine church tower, built after the fire of 1694, is a landmark. The Hospital of Lord Leycester was founded by Robert Dudley, Earl of Leicester, in 1571; the beautiful group of half-timbered buildings, dating from the late 15th cent., includes the old W. Guild Hall. Agriculture is the chief local occupation; manufs. include agric. implements, edible gelatines, lozenges and other sweetmeats, mechanical and motor-engineering products, carpets, and pistons. W. forms a single parl. div. with Leamington. Pop. 15,510.

2. Tn of Rhode Is., U.S.A., in Kent co., on Narragansett Bay, with manufs., especially cotton, agriculture and fisheries; coast resort. Pop. 43,028.

3. City of Darling Downs (q.v.). Queensland, Australia, 100 m. SW. of Brisbane. Dist. Industries: wheat, dairying, maize and other grain and fodder crops, mixed farming, wool, mutton, lamb, fruit, vegetables, honey, timber, coal, limestone, and other minerals. Pop. 9370.

Warwickshire, midland co. of England, bounded on the N. by Staffordshire, S. by Gloucestershire and Oxon, E. by the cos. of Leicester and Northants, and W. by Worcestershire. The surface is very variable, though there are no great elevations, Broom Hill (830 ft) being the highest. The prin. rivs. are the Avon, with its numerous tribs., which runs right across the co., the Stour, and the Tame. In the W. is the region that was once the forest of Arden, made famous by Shakespeare. The co. possesses immense coal-fields in the NE.; ironstone, lime, and cement are also worked. Almost the whole co. is under cultivation; dairy farming, fruit growing, and mkt gardening are carried on, and oats and wheat are the main crops. Industrial centres include Birmingham, in the NW., and Coventry; both are co. bors. and outside the administrative co. of W. Besides these 2 cities, the most important tns are the bors. of Leamington, famous for its spa, Nuneaton, Rugby, Solihull, Stratford-upon-Avon, the bp. of Shakespeare, Sutton Coldfield, and Warwick, the co. tn. The co. is divided into 6 parl. divs. There is a univ. at Birmingham. The co. is famous for its antiquities, Warwick Castle and Kenilworth Castle being the most famous. The Beauchamp Chapel at St Mary's Church, Warwick, is notable, and there are the remains of a Cistercian monastery at Coombe Abbey, and of other religious houses at Merevale, Stoneleigh, Maxstoke, Kenilworth, and Wroxall. Edgehill gave its name to the battle of 1642, in the Civil war. The area of the geographical co. is 628,994 ac.; pop. 1,880,500. See Sir William Dugdale, *Antiquities of Warwickshire*, 1730 ed.; *The Victoria History of the County of Warwick*, vols. i-vi, 1904-51; A. Mee, *Warwickshire*, 1942; A. Burgess, *Warwickshire*, 1950.

Warwickshire Regiment, The Royal. This Eng. regiment, formerly the 6th Foot, was raised in 1673 for service under the Dutch Gov. It first came on to the Brit. estab. in 1685 and served under Wm III at Namur, 1695. At the beginning of the 18th cent. it served as marines on both sides of the Atlantic, and reverted to a foot regiment about 1705, suffering heavily at Almanza in Spain, 1707. After a period in the W. Indies the regiment served with much distinction under Wellington in the Peninsula. Further honours were gained at Niagara, S. Africa (1846-7), Khartoum (1898), and S. Africa (1899-1902). During the First World War 30 battalions were raised and served in France, Flanders, Italy, Gallipoli, Mesopotamia, and Persia. In the Second World War the regiment fought in France, N. Africa, and Italy, and notably in the battle of Normandy (1944). See C. L.

Kingsford, The Story of the Royal Warwick Regiment, 1921.

Wasatch Mountains, Rocky mt range of Utah and Idaho, U.S.A., largely pine-covered. They form the E. margin of the Great Basin and contain at least 4 peaks over 11,000 ft high. The loftiest is Timpanogos Peak (12,008 ft). The range includes parts of Uinta and Wasatch national forests in Utah, and is drained by the Weber, Ogden, and Provo rivs. Copper, lead, silver, and gold are mined near Provo and Salt Lake City.

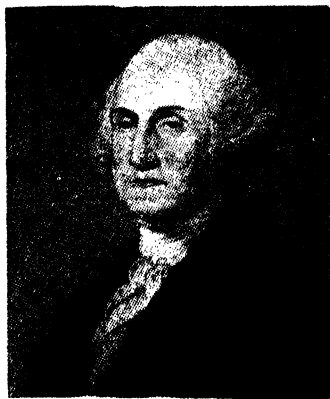
Wasdale, valley in SW. Cumberland, England, in the Ennerdale (q.v.) rural dist., with Wastwater, a lake nearly 3 m. long. W. Head is a famous rock-climbing centre.

Wash, The, inlet (22 m. by 15 m.) of the N. Sea, on the E. coast of England, between the cos. of Norfolk and Lincoln, receiving the Welland, Ouse, Nene, and other rivs. Its shores are low and marshy. Since 1948 a large area has been drained under a reclamation project.

Washford, vil. of Somerset, England, 3 m. from Watchet. To the S. are the lovely ruins of Cleve Abbey, founded by Cistercians in 1188. Pop. 600.

Washing Machines, see LAUNDRIES.

Washington, George (1732-99), first president of the U.S.A., b. Pope's Creek, Westmoreland co., Virginia. He was descended from pure Brit. stock from Sulgrave Manor, Northants, his great-grandfather, John W., having migrated in



GEORGE WASHINGTON

1657. Largely self-taught, he began his career as a land surveyor, but inheriting the Mt Vernon estate from his brother Lawrence, W. settled down as a country gentleman. He had made a good impression on Governor Dinwiddie, and the latter soon made him lieutenant-colonel of the Virginia military. In May 1745 W. was ordered to drive the French out of Fort Duquesne. He succeeded, but was in turn besieged in Fort Necessity, and on 13 July surrendered.

In 1758 W. resigned command of the Virginia troops and married a rich widow, Martha Custis. The union of their plantations made W. one of the wealthiest men in his state. W. threw himself into the work of looking after his estates. He entertained lavishly, and thus came into contact with notable men from all over the Eng. colonies in America. He was elected to the Virginia House of Burgesses, and re-elected. He soon displayed a growing interest in the disputes between the colonies and the Eng. Crown, and Virginia elected him as one of its delegates to the First Continental Congress. In Philadelphia he bought arms and ammunition which he sent to Virginia, and when the Congress adjourned he returned to Virginia to take up the active training of the raw soldiers.

When the Second Continental Congress met in Philadelphia the general feeling among the New Englanders was that they must have a Southern man to lead them, since only thus could they be sure of uniting all the colonies in one common cause. War had already started, and John Adams (q.v.) proposed W. as commander-in-chief of the colonial armies and on 15 June 1775 W. took over the command. The Amer. troops often lacked arms, munitions, food, and clothes; and W. had to combat faction and treachery among his gens., including the episode of Benedict Arnold's (q.v.) treachery. Knowing the jealousy of Congress, W. kept in close touch with it, and let its members know his every move and every motive. When he took charge of the Amer. forces at Boston he won a notable success. His occupation of Dorchester Heights compelled Howe to evacuate Boston in Mar. 1776. He then had a succession of reverses, notably at the battle of Brooklyn Heights, but in New Jersey he turned and beat his enemy at Trenton and Princeton. Following his defeats in the battles of the Brandywine and Germantown in the autumn of 1777, W. led his 11,000 men into winter camp at Valley Forge, 20 m. from Philadelphia. The spring brought better news for the Americans. The French were coming into the war. Clinton, who succeeded Howe, had been ordered to give up Philadelphia and return to New York. W. harassed his troops, notably at the battle of Monmouth. When Clinton reached New York, W. took up a position at White Plains and for 3 years, while fighting was going on elsewhere, the 2 armies watched each other. At last, W.'s chance came when Cornwallis met with difficulties in N. Carolina, withdrew his army to Virginia, and finally shut himself up in Yorktown. Here W., who had hurried S., forced him to surrender (1781). When the British finally moved out of New York for home the Amer. army under W. entered the tn. A few days afterwards, on 4 Dec. 1783, W. went via Philadelphia to Annapolis, Maryland, where Congress was sitting. Here on 23 Dec. he resigned his commission as commander of the armies.

For 4 years he strove to recoup his

shattered fortunes. At length it was decided to call a convention to frame a constitution, and W. was chosen as one of the Virginia delegation. The convention opened 13 May 1787 in Philadelphia, and W. was unanimously chosen to preside. Others wrote the constitution, but it was W. who did much to remove difficulties. He was unanimously chosen as first president of the rep., although he was reluctant to assume the burden. He was inaugurated 30 April 1789. (See UNITED STATES OF AMERICA, *History*, for the events of W.'s presidency.) W. wished to retire at the end of his first term, but at the instance of the rival leaders, Thomas Jefferson and Alexander Hamilton, he was elected to a second term by a unanimous vote. He declined a third term, being weary of the unjust attacks of bitter partisans. On giving up office, he made a famous farewell address, warning the country against entangling alliances and advising it to keep aloof from European quarrels.

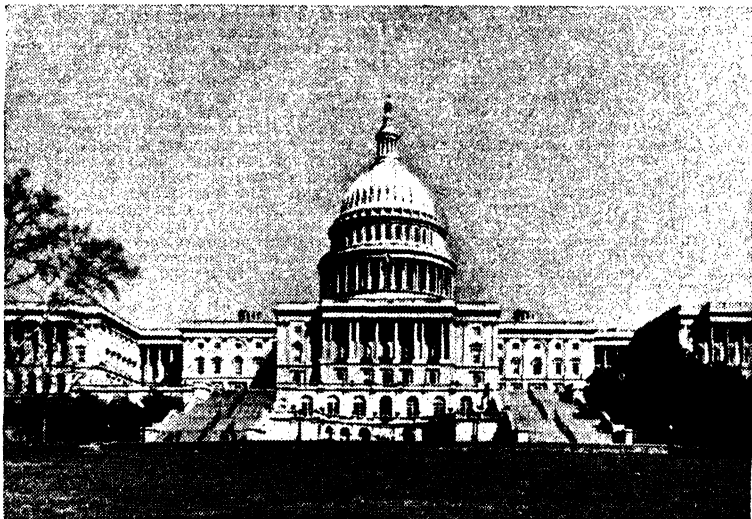
W. was pre-eminently a product of the Virginia of his time, with a solid, disciplined character, neither brilliant nor profound. The force which brought him to pre-eminence was an honourable but overmastering ambition for public esteem, a determination not to remain an obscure Virginian, and a sincere regard for what he considered to be the best interests of the Thirteen States.

John C. Fitzpatrick ed. a definitive ed. of his letters and papers (39 vols.), 1931-44. See lives by J. Marshall, 1804-7; W. Irving, 1855-9; N. Hagood, 1901; R. Hughes, 1926-30; also M. Ashley, *Mr President*, 1948; Douglas S. Freeman, *George Washington* (5 vols.), 1948-52.

Washington, cap. of the U.S.A., in the Dist. of Columbia, an area of 70 sq. m. enclosed by the state of Maryland, except in the SW., where the Potomac R. forms the boundary. W. stands on the l. b. of the Potomac R., which is navigable for large vessels up to this point. A portion of the Dist. of Columbia (D.C.), embracing 6654 ac., is known in law as the City of W., 'the Federal Capital.' But that name is a geographical distinction only, as the ter. it includes is not a municipal gov., separate from the rest of the Dist. of Columbia, but is subject to the same national and municipal control. W. was made the capital by an Act of Congress passed in 1790, and the gov. was transferred there from Philadelphia in 1800. George Washington himself was responsible for its original plan, and took great interest in the city that was to bear his name. The city was regularly laid out according to the design of Maj. Pierre l'Enfant, a Fr. engineer. The Capitol is the central site. This splendid building is on a rising ground at the E. end of Pennsylvania Avenue. It was built to the design of Sir Wm Thornton, a Brit. W. Indian. The cornerstone was laid by George Washington in 1793, but the building was burned by the British in 1812. The erection of the present building was begun in 1818 by Bulfinch; it is constructed of freestone and consists of a

central block and 2 wings, in the N. of which is the Senate Chamber. The prin. feature of the capitol is the rotunda, 96 ft in diameter, and height 288 ft above the ground. At the other end of Pennsylvania Avenue is the White House, the official residence of the president of the U.S.A. The city has many other magnificent buildings, among which may be named the Pentagon, the Patent Office, the General Post Office, the National Observatory, the Corcoran Gallery of Art, the Lincoln Memorial, the Thomas Jefferson Memorial, the Pan-American Union, Constitution Hall, the Amer.

binding, and manufacturing depts. The country community is mainly agric., flowers and foliage plants forming 60 per cent of the total agric. products. Dairying is also important. The manufs., like the agriculture, are mainly incidental to the needs of the cap. Slaughtering and meat packing are important occupations, there are planing mills, and marble, granite, and other stones are dressed, and there is a naval shipyard. Printing and publishing are leading industries, and there are bakery manufs. W. has railroad connections with most of the important tns of the U.S.A. It is 38 m.



United States Information Service: American Embassy
THE UNITED STATES CAPITOL, WASHINGTON

Univ., and the Howard (coloured) Univ. There are also Georgetown Univ. and George Washington Univ.

W. is, in many aspects, the most beautiful city in the U.S.A., with its white stone and marble gov. buildings and wide, tree-shaded avenues. Between the State Dept. near White House grounds, and the Capitol are sev. gov. buildings. The National Gallery of Art and the Library of Congress are also particularly notable. The magnificent stone bridge across the Potomac is 1452 ft long, and connects W. with the Arlington National Cemetery. On the Virginia side of the Potomac stands the Pentagon (q.v.) the world's largest office building, accommodating Amer. War Dept personnel and built 1941-3. W. is mainly a residential city. The U.S. Gov. employs large numbers of citizens in the offices of the various depts, and normally employs thousands of people in its engraving, printing, book-

from Baltimore, 136 m. from Philadelphia, and 226 m. from New York. There are also Bolling Air Force Base, Anacostia Naval Air Station and National Airport. Sev. important treaties have been signed here (*see* WASHINGTON CONFERENCE (1921); WASHINGTON, TREATIES OF). About one-third of the pop. is Negro. W. is subjected to control by Congress and by Commissioners appointed by the President and confirmed by the Senate. Since 1895 W. by Act of Congress has been made co-extensive with the Dist. of Columbia. Pop. (1950) 802,178. *See* W. B. Bryan, *A History of the National Capital, 1924-26*; Wm Tindall, *Standard History of the City of Washington, 1914*; C. Moore, *Washington Past and Present, 1929*; H. P. Caemmerer, *A Manual on the Origin and Development of Washington, 1939*.

Washington, the 'Evergreen State,' Pacific State of the U.S.A., was formerly

part of Oregon. It is situated in the extreme NW., bounded N. by Brit. Columbia, E. by Idaho, S. by Oregon, W. by the Pacific Ocean. It was created a ter. in 1853, and in 1889 was admitted to statehood. The state is traversed from N. to S. by the Cascade Range, whose general altitude is between 6000 and 7000 ft, but there are sev. volcanic peaks rising above 10,000 ft. Mt Rainier (or Tacoma) reaches 14,408 ft; it is surrounded by a national park. There is also a lower, coastal range in the W., the Olympic Mts. In the NW., between the 2 ranges, Puget Sound, an inlet with many harbours, on which stand cities such as Seattle, Tacoma, and Olympia, is an important commercial centre. The Columbia R. enters the state from Brit. Columbia on the N. and flows along 300 m. of its S. boundary. Its chief affluent is the Snake R., which joins it near S. Ainsworth. E. of the Cascades are stretches of arid or semi-arid land, with fertile areas. Here are great cattle and sheep ranges, and here also much wheat is grown. Wheat is also grown in the W., which receives a heavy rainfall and has a profuse vegetation. Agriculture is the chief industry, barley, oats, and maize being grown as well as wheat. Fruit is also an important product, W. having the largest apple crop of all the states. More timber (chiefly coniferous) is cut here than in any other state except Oregon. The mining of coal, copper, mercury, lead, magnesite, zinc, silver, and gold is also carried on. The state produces 30 per cent of the nation's magnesite and 35 per cent of its lead. Other minerals include mercury, clay products, limestone, marble, granite, platinum, tungsten, and diatomite. Aluminium refining is important. The Grand Coulee Dam is part of the Columbia R. reclamation project; other dams are Bonneville and McNary. Industrial establs. include lumber and planing mills, and flour mills; meat-packing and the manuf. of dairy products are important; shipbuilding and aircraft manuf. expanded greatly during the Second World War. Seattle is the landing-place of the N. Pacific fisheries and handles also the bulk of the Alaskan trade and much Asiatic and Panama Canal trade. W. leads the nation in total catch of sea foods. There are 18 Indian reservations in the state, the largest being that of Coleville. The cap. is Olympia (pop. 15,819), and the chief cities are Seattle (467,591), Spokane (161,721), Tacoma (143,670), Bellingham (34,112), and Everett (33,849). The Univ. of W. near Seattle had an attendance in 1947-8 of 18,000 students, and the State College at Pullman for Science and Agriculture (founded 1890), 7200 students. The area of the state is 68,192 sq. m. and the pop. 2,378,963. See E. S. Meary, *History of the State of Washington*, 1924; L. Pollard, *History of the State of Washington*, 1937; Federal Writers' Project, *Washington: A Guide to the Evergreen State*, 1941.

Washington: 1. Urb. dist. of Co. Durham, England, 6 m. from Gateshead; home of George Washington's earliest forebears.

Coal mining, quarrying, iron, steel, and chemical manufs. are carried on. Pop. 17,600.

2. City of Pennsylvania, U.S.A., co. seat of Washington co., 25 m. from Pittsburgh. It is a well-built city, the seat of Washington and Jefferson College and of Washington Seminary. It has iron and steel works, and produces wool, glass, chemicals, molybdenum, and ferro-alloys. It has coal mines and natural gas and oil wells. Pop. 26,280.

Washington, Mount, culminating peak of the White Mts. in the Presidential Range, Coos co., New Hampshire, U.S.A. It is 6288 ft high and ascended by a rack-railway (1869) and a carriage (now motor-car) road (1861). It is the highest peak in New Hampshire and in the NE. U.S.A., and marks the centre of a summer and winter resort area. There are a hotel and a meteorological station on the summit.

Washington, Treaties of: (1) That made in 1846 with Great Britain by which the boundary W. of the Rocky Mts was estab. (2) That made in 1854 with Great Britain relative to fisheries, duties, and navigation in British N. America, often called the 'Reciprocity' Treaty. (3) That made in 1871 with Great Britain for the settlement of all causes of difference. (4) That of 1922; see next article.

Washington Conference (1921). With the defeat of Germany after the First World War naval rivalry seemed dead. But both Japan and the U.S.A. had adopted huge building programmes which continued after the war, and in view of this fact Britain announced that it had adopted a one-power standard and that 4 new battleships of 48,000 tons displacement were to be built. So naval competition was once more manifest, and the situation was rendered more delicate by evident Amer. dislike of the Anglo-Jap. alliance. In order both to arrest this competition and seek a more satisfactory relationship in the Pacific, President Harding took the initiative and, on 11 Aug. 1921, invited the Brit., Jap., Fr., and Italian govts. to a conference at Washington to discuss not only the limitation of naval armaments but also general questions relating to the Far E. China, the Netherlands, Portugal, and Belgium were also represented. The Treaty subsequently signed on 6 Feb. 1922 put a stop to naval competition by stabilising the battleship strength of the 5 Powers in an agreement to a tentative 10-year building holiday; limiting both the maximum individual tonnage of, and the maximum calibre of gun which could be mounted in, capital ships, aircraft carriers, and cruisers respectively. To satisfy Japan's desire for security, it was agreed that none of the Powers should augment the defences of their outlying possessions in the Pacific, which meant that, while Japan was forbidden to fortify the mandated is., America could not strengthen the Philippine bases nor those of Guam. With this agreement satisfactorily concluded, the Anglo-Jap. alliance was allowed to lapse. Finally, it was pre-

scribed that a further conference was to be held in 1930, by which time all parties had reasons for desiring a new treaty. (See LONDON NAVAL CONFERENCE, 1930.)

Washita, see OUACHITA.

Wasmes, in the prov. of Hainaut, Belgium, 6 m. WSW. of Mons. It is the centre of the coal-mining dist. of the Borinage. Vincent van Gogh (q.v.) lived and worked here 1878-80. Pop. 15,000.

Wasp, winged, stinging, predaceous insect of the order *Hymenoptera*, thousands of species of which are distributed throughout the world. In Britain 7 species of the *Vespidæ*, which are social, and *Eumenes* and *Odynerus*, solitary, predominate among the 290 or more species. On a single occasion a male *W.* fecundates the queen *W.* with sperms, the mating taking place on the wing. The queen can then lay sperm-impregnated eggs to produce workers or other queens, or non-impregnated eggs to produce males. In the autumn the males and workers die, and the queen hibernates in a sheltered place until she revives to found a new colony in the spring. The eggs laid by the queen *W.s* hatch, and the growing larvae feed on insects; then, sealed in cells or cocoons, after 4-6 weeks, transformed into young *W.s* they bite their way out. The *Vespa vulgaris* (social), the common yellow-black banded *W.* seen about Brit. homes and gardens, causes intense pain from venom when it stings. In the spring the queens build nests in the earth which are completed by the workers as they develop, using sound, weathered wood from posts and trees, chewed to pulp, for their building material. Extending downwards from a covering layer, and suspended from pillars, horizontal combs of vertical, hexagonal cells are built as required in layers. Each oviposited egg is stuck in the inverted cell to prevent its falling out, and insects are fed to the hatched-out grub until it fills the cell. Two or three hundred *W.s*, one queen, many workers, and fewer males live in each colony. The solitary queen *W.* paralyses a caterpillar by stinging, then lays or suspends an egg in a hole burrowed in the earth, a wall, post, or plant stem, beside the helpless grub, which provides food for the one hatched and growing larva. It is the custom for solitary *W.s* to make single nests in small groups. Most *W.s* store honey and pollen in cells as food, and, as they collect nectar and pollen, pollinate fruits and flowers; they feed also on the juices of many ripe fruits. *W.s* are not pests; they reduce garden insect foes, but may become a nuisance. A *W.'s* nest may be destroyed by dissolving $\frac{1}{2}$ lb. of potassium cyanide, a deadly poison, in boiling water; cotton-wool should be saturated with this solution, and, with a pointed stick, plugged into the entrance to the nest; after an hr the nest may be dug out. See A. D. Imms, *Insect Natural History*, 1947; J. Crompton, *The Hunting Wasp*, 1948.

Wasail (O.E. *was hal*, be thou whole, of good health), originally an expression

of good wishes at festivities, especially a 'toasting' or salutation in drinking. Later it was used for a drinking-bout or carouse, and then for the beverage used (especially at Christmas and New Year).

Wassermann, August von (1866-1925), Ger. bacteriologist and immunologist, b. Bamberg and studied at Erlangen, Vienna, Munich, and Strasburg. After qualifying in medicine in 1888 *W.* began to practise at Strasburg, but in 1890 became an assistant at the Robert Koch Institute in Berlin, where he was appointed professor in 1902. In 1913 he became director of the Institute of Experimental Therapy, Kaiser Wilhelm Society. He carried out important investigations on toxins and antitoxins, diphtheria antitoxin, cholera immunisation, cancer, diagnosis of tuberculosis, and blood grouping. By modifying the complement-fixation reaction of Bordet (q.v.) and Gengou he devised the Wassermann reaction (q.v.), a specific blood test for the diagnosis of syphilis (1906). With *W. Kolle* he wrote *Handbuch der pathogenen Mikroorganismen* (6 vols.), 1903-9, and made many contributions to medical journals.

Wassermann, Jakob (1873-1934), Ger. novelist, b. Fürth, Bavaria, of Jewish parents. His novels are a study of post-1918 conditions and problems, mostly of subtle psychological analysis. They have been trans. into most European languages. Perhaps his greatest novel is *Christian Wahnschaffe*, 1919; Eng. trans. *The World's Illusion*, 1921. Other works include *Der Fall Maurizius*, 1928, *Doktor Kleverhoren*, 1932, autobiography *Mein Weg als Deutscher und Jude*, 1921, and *Selbstbetrachtungen*, 1933. See J. N. Blankenage, *The Writings of Wassermann*, 1942.

Wassermann Reaction, so called after the Ger. bacteriologist August von Wassermann (q.v.), who, in 1906, together with Neisser and Bruck, followed up Bordet's and Gengou's discovery of the 'complement-fixation' reaction in the blood and spinal fluid and applied it to the diagnosis of syphilis (q.v.). This discovery has proved to be of immense value to the medical profession in the treatment, cure, and prevention of the disease.

Waste, in law a term denoting any spoil or destruction done or permitted by the tenant to houses, woods, lands, or other corporeal hereditaments (q.v.) during the continuance of his particular estate (q.v.) therein. *W.* is said to be either (a) *voluntary*, i.e. acts of commission, such as pulling down buildings, felling timber, opening mines, etc.; (b) *permissive*, i.e. acts of omission, such as non-repair of buildings. A tenant for life, even though expressly declared by the settlement to be 'not impeachable' for *W.*, is nevertheless liable for equitable *W.* The remedy for *W.* is by action for damages and injunction (q.v.). See also **TIMBER**.

Waste Lands, see **LAND RECLAMATION**.

Waste Products, see **REFUSE, DISPOSAL** OF.

Watch, on board ship, one of the 2 parts (starboard and port W.s) into which the crew is divided for the purpose of taking duty alternately. The term is also applied to the periods of duty worked. The night is divided into 3 W.s: from 8 to 12, first W.; from 12 to 4, middle W.; from 4 to 8, morning W. The day has 4 W.s: forenoon, 8 to midday; afternoon, midday to 4; and the 'dog-watches,' 4 to 6, and 6 to 8, whose purpose is to change the turn. The list of men appointed to watch is known as the 'watch-bill.' Time is shown by the striking of the 'watch-bell,' which is struck once for every 1-hr. Thus 12 30 a.m. is 1 bell in the middle W., 3 a.m. is 6 bells, and 6 30 p.m. is 1 bell in the second dog watch.

Watch. A time-measuring instrument (see HOROLOGY) similar to but smaller than the clock (q.v.) and is generally carried on the person. The W. only became a practical possibility as the result of the invention of the mainspring, which is generally attributed to Peter Hele, or Henlein, a Nuremberg locksmith, c. 1510. He was able to produce springy strips of steel, and when one of these was coiled tightly round an arbor the force it exerted in trying to straighten itself out again was used as the driving force.

The first W.s were cylindrical in shape, like the small table clocks of the period, measuring some 2½ in. in diameter and about half that height. These were known as the *canister* and later as the *drum* or *tambourine*. Many of the 16th-cent. W.s still in existence have either an alarm or hour-striking mechanism; some have both. To allow the bell to be heard more clearly, the cases were pierced round the edge and often on the bottom also—the work being beautifully executed and lending great charm to the design. The simple round drum gave way to more fanciful shapes—oval, octagonal, etc.—but the dial always remained circular. The edges next became rounded, accompanied by domed covers, resulting in the type known as the Nuremberg egg—as Ger. W.s of the first part of the 17th cent. are called. Enamel, as a decorative agent, was introduced c. 1630 from Blois, the watchmaking centre in France, and many fine cases were produced, some finished in translucent and some in opaque enamel, while others were painted on an enamel surface. Towards the middle of the 17th cent., chasing and repoussé work was much used. *Form watches* of many patterns made their appearance towards the latter part of the 16th cent., sometimes taking the shape of a cross, star, book, animal, beetle, sphere, etc., while others were made in the grotesque form of a skull or death's head.

As with early clocks, the first W.s had only one hand. They had been in use for 150 years before their timekeeping became sufficiently reliable to make a minute hand of any practical use. From about 1640 an additional cover, or outer case, was provided to protect the decorative work of the case proper, as well as the dial and hand, for no glass was used

on W.s until much later. The outer case was frequently made of gold or silver, with designs in chasing or repoussé work, and their production formed an important part of the watchmaking industry. Some were covered with tortoiseshell, horn, leather, shagreen, and other kinds of skin. The use of a case within a case, or *pair cases*, as they are called, continued until the early 19th cent. Sometimes a third case of plain design appeared, the object being to protect the outer part of the pair case.

The more or less transparent covers were originally made of comparatively thick crystal. At first they were not transparent enough, and it was still necessary to lift the cover to read the time. Glass as a protection for the dial and hand came later.

All early W.s were large, thick, bulky, and expensive; they were worn on the girdle, more for adornment than use. They were controlled by the verge escapement (see CLOCK), which required a great deal of space. The invention of the balance spring (frequently called the hairspring) by Dr Robert Hooke (q.v.), c. 1675, marked a great step towards good timekeeping, and the balance and spring have been used as the controller of watch escapements ever since its introduction at that time. After this the general tendency was for W.s to become round and to be carried in the pocket of the waistcoat and to be considered as articles of use. The period of elaborate decoration ended towards the end of the 17th cent.; with the W. hidden in the pocket there was no need for its continuance.

The earliest Eng. W.s, examples of which are to be found in the Brit. Museum, date from about 1540. During the first quarter of the 17th cent. great progress was made, and from that time Britain took the lead in the making of W.s and clocks. The most outstanding exponent of the art was Thomas Tompion (q.v.). In 1698 an Act of Parliament was passed obliging makers to put their names on the W.s they made, to prevent discreditable imitations being sold abroad as Brit. Smuggling assumed tremendous proportions, and many W.s bearing well-known Eng. names were brought into Britain.

Escapements. The cylinder escapement, which enabled W.s. to be made thinner than before, was invented by George Graham, c. 1725. This was the first step towards *accurate* timekeeping in W.s. Other escapements followed, and in 1757 Thomas Mudge (q.v.) made the first detached-lever escapement, which, with but slight modification, is to be found in every reliable W. made to-day. His first lever W., made for George III and given by him to his consort Queen Charlotte, is now in the Royal Collection at Windsor Castle.

The lever escapement is really an adaptation to W.s of the dead-beat escapement (see HOROLOGY). The main parts are the escape wheel; the lever, with pallets at one end and terminating in a fork or notch flanked by horns at

the other extremity; the balance, with spring and double rollers secured to the balance staff (the larger roller carries the impulse or ruby pin, and the smaller acts with the horns of the lever to form a safety device to prevent the escapement from unlocking if the W. gets a jar or knock); and the banking pins to limit the movement of the lever. When the escapement is locked, a tooth of the escape wheel is held against the locking face of one of the pallets. As the balance oscillates to and fro, the impulse pin enters the notch of the lever and moves it to one side. As this happens the appropriate pallet is raised to clear the wheel and thus unlock the escapement. As the escape wheel begins to move, it pushes the pallet out of the way, thus causing the notch of the lever to press against the impulse pin, thereby giving impulse to the balance. A great advantage of this escapement is that the impulse pin is only in the notch of the lever for a short part of its period of swing. The remaining part of its swing is known as the supplementary arc, during which the escapement is entirely detached. Escapement interference is, therefore, at a minimum. The cycle is then repeated in respect of the other pallet.

In older Eng. lever W.s made up to about 1830, a pointed-tooth escape wheel is employed. The pallets are mounted at right angles to the lever. In the modern type, first developed by the Swiss c. 1840, a club form of tooth is used and the escapement is arranged in a straight line. The club tooth is more robust, can be made of steel, and is easier to produce by quantity-production methods.

No W. can be described as a jewelled lever W. unless it has a minimum of 15 jewels—i.e. 2 pallet stones, impulse pin, 2 jewel holes and end-stones for balance staff, 2 jewel holes for pallet staff, 2 jewel holes for escape, fourth and third wheels. Many W.s have 17 or more jewels.

The lever escapement is now frequently used in clocks, giving the advantage of greater portability, moving for dusting purposes, and so on. A cheap form of escapement, known as the pin-pallet escapement, was developed by Roskopf, c. 1865, and was first exhibited publicly at the Paris Exhibition of 1867. It works on the lever principle, but instead of jewelled pallets, it is provided with two steel pins. The impulse pin is also of steel. Generally, a pin-pallet W. has either no jewels at all or a maximum of five. It cannot be compared with a genuine lever W.

Compensation. The first step towards compensating a W. against variations in temperature was made by John Harrison (q.v.). He invented a bimetallic strip, or what is known as Harrison's bimetallic curb, which comprised thin strips of steel and brass, securely fixed together all along their length. One end of this curb was secured to the plate of the W., while 2 curb pins were mounted at the other end. As temperature rose,

the strip expanded, but since brass expands with heat more than steel, the effect was for the strip to curl, thus making the curb pins slide along the outer coil of the balance spring, thereby shortening its effective length. A fall in temperature had the opposite effect. In his later writings Harrison said that the compensating device should be in the balance itself and not in the spring. After learning about Harrison's curb, Pierre Le Roy of Paris devised the first means of compensating by means of the balance. The bimetallic balance was later improved by Thomas Earnshaw, who fused the brass on to the steel instead of riveting or soldering. The bimetallic compensation balance is still extensively used. Modern compensation is achieved by using a balance spring of one of the invar alloys in conjunction with a balance of nickel or beryllium alloy, with which the differences in rate caused by variations in temp. likely to be met with in general use are so small as to be almost negligible in W.s for ordinary use.

Fusee. Early escapements were particularly susceptible to every variation in the strength of the driving force, and it was necessary to employ some power-equalising device if tolerably good time-keeping was to result. The fusee was invented with the object of equalising the pull of the mainspring throughout the run of the clock or W.; it became widely used, and was efficient. Its invention is often attributed to Jacob the Czech (c. 1525), although drawings by Leonardo da Vinci made some 40 years earlier are in existence.

The fusee is a conical-shaped piece of brass, its taper being a gradual curve from the greatest to the smallest diameter. A spiral groove is cut round its circumference running continuously from one end to the other. One end of a chain is secured to the spring barrel on to which it is wound when the movement is assembled, the other end being hooked to the large diameter of the fusee. As the W. is wound, the chain is transferred from the barrel on to the fusee. As the W. goes, when the spring is fully wound it pulls on the chain and exerts its maximum force on the small diameter of the fusee, but as it runs down and its power diminishes it acts on an ever-increasing radius. The fusee is thus a lever of constantly increasing length, and the leverage exerted by the spring increases just as the force of the spring tends to decrease. The result is almost even force at the teeth of the great wheel throughout the whole period of going.

With the growing efficiency of escapements, particularly the lever escapement, and with better mainsprings, the fusee became less important and was gradually discarded. On the Continent it ceased to be used in W.s much sooner than was the case in England. There it was retained up to (and sometimes beyond) the end of the 19th cent., after it had ceased to be necessary or desirable, and when it served only to complicate the mechanism.

This was one of the reasons why Brit. makers lost the lead in the watchmaking trade towards the end of the 19th cent. To-day the fusee is used in most marine chronometers and in some good spring-driven clocks, but not in W.s.

Wrist Watches. The introduction of the wrist W. brought about a revolution in the W. manufacturing industry. The forerunner of the modern wrist W. made its appearance soon after the turn of the present cent., when, in some instances, small ladies' pocket W.s were fitted into a specially made leather or gold adaptor to be worn on the wrist. The wrist W. struck a new note of appeal, and the First World War hastened its popularity owing to the ease with which the time could be read without having to undo the coat or uniform. The main differences between a pocket and wrist W. are that there is no bow on a wrist W.; the winding button is smaller and neater; and loops, lugs, or side joints are attached at the 12- and 6-o'clock positions for the strap, bracelet, or other form of wrist band, these being the best positions for reading the time, no matter on which wrist the W. is worn. The winding button is at the 3 instead of the 12-o'clock position, for the obvious reason that it does not get in the way of the lugs or loops.

Water-resistant Watches. With improvement in production methods it has become possible to make cases so that they will resist the ingress of water. Several types of water-resistant cases are made, some with screw-on covers, some with snap-on covers, most of them relying upon some form of sealing washer at the points where the covers fit on to the case, and a packing gland, usually of plastic material, for the winding stem. The glass, which, incidentally, in all modern W.s is of some plastic and more or less unbreakable material, is a particularly good fit.

Anti-magnetic Watches. The steel parts of a W. are all liable to be magnetised if exposed to a magnetic field. This is largely overcome in modern W.s by making the balance spring of one of the invar alloys, which are non-magnetic.

Shock-resistant Watches. Many W.s are now provided with sprung jewels for the pivots of the balance staff. The result is that when the W. receives a sudden knock or jar the bearings give, and the risk of damage to sensitive parts is much reduced.

Self-winding Watches. Louis Recordon of Soho, London, was granted a patent in 1780 for a W. which wound itself on the pedometer principle. The movement of the body when walking caused a pivoted weight, geared up to the mainspring, to oscillate.

The first self-winding wrist W. was invented by John Harwood, b. at Bolton in 1890, who secured a patent in 1924. A centrally pivoted weight oscillates between bankings at every movement of the wrist, and by means of suitable gearing the mainspring is wound in this way. Since Harwood's original patent, nearly

every W. manufacturer has produced self-winding models. Some of these act on Harwood's principle, while in others an eccentric weight is made to rotate through the full circle, causing the spring to be wound sometimes in one and sometimes in both directions of travel.

Repeating Watches. A repeating W. is one which, at the will of the owner, can be made to strike the time on gongs coiled round the circumference of the movement. Sometimes the blows are struck on the band of the case, when the W. is called a dumb repeater because there is no music in the blows. The repeating mechanism is operated by a separate mainspring and train of wheels, and is automatically wound—in early repeaters by depressing a push piece in the pendant, and in modern types by moving a slide on the outside of the band of the case.

There are 2 gongs: one—the base gong—is used to strike the hrs and also the deep note of the ting-tang chime; the other—the treble gong—is used to strike the min., or other intervals catered for, and also the higher note of the quarter chime. Some repeaters chime the hrs and the quarters; some the hrs, quarters, and half-quarters; some each 5 min.; and some all the min. The mechanism is somewhat complicated. See G. H. Baillie, *Clocks and Watches*, 1951; T. P. Camerer Cuss, *The Story of Watches*, 1952. See also CLOCK; CHRONOGRAPH; CHRONOMETER; TOMPTON.

Watch Tower Bible and Tract Society. The, see JEHOVAH'S WITNESSES.

Watchet, urb. dist. and port of Somerset, England, on the Bristol Channel, 17 m. NW. of Taunton. The tn dates back to A.S. times. There are large imports of wood pulp and esparto from overseas; here are paper mills, and paper-bag and shirt factories. Pop. 2650.

Water. W. covers 72 per cent of the surface of the globe and occupies depressions greater than the land above sea-level could fill. It solidifies and evaporates at normal earth temps., and in the state of vapour forms a minute but extremely important constituent of the atmosphere. It freezes at 0° C. or 32° F., and boils under 760 mm. mercury at 100° C. or 212° F. On freezing it expands by $\frac{1}{9}$ its bulk; 1 ml. weighs 1 gram at 4° C., or 39·2° F., or 1 cub. ft weighs 62·428 lb. at its greatest density, and it forms the unit of specific gravity. At 62° F. it has a density which is about 790 times that of air, which in the ordinary state contains about 4 grains of W. per cub. ft. Seven-eighths of the animal body is composed of W.

Chemically, it is composed of 2 volumes of H (hydrogen) to 1 of O (oxygen), the proportions by weight being 1:8. It may be prepared by exploding a mixture of those gases in proper proportion, or by burning one in the other. The combustion of most H compounds is accompanied by the formation of W. W. is, when pure, a faint greenish-blue and odourless; it is very slightly compressible, and a bad conductor of heat and

electricity. It has the highest specific heat of any substance known, and is thus the best cooler through a given range of temp., 79-74 cal. per gram of ice (the latent heat of fusion) are required to turn ice into W., while 539.1 cal. per gram of W. (the latent heat of vaporisation) are required to convert it into steam. In the reverse changes of solidification or liquefaction exactly the same quantities of heat are evolved. Chemically, W. is neutral, forming acids with anhydrides. Its solvent action on many substances renders it very active, and brings about reactions between dissolved substances; with some of these it forms hydrates, with others it enters into their crystal growth as W. of crystallisation. Potassium, sodium, and some other metals decompose it. It is generally held that the earliest forms of life occurred in W. Its change of form and mobility have immense effects on the earth, distributing the sun's heat, shielding the land from excessive temps., and eroding the land surface. The pressure it exerts on freezing, not less than 30,000 lb. per sq. in., bursts iron pipes and disintegrates rocks. Its purest natural form is rain, which, however, contains dust and gases dissolved from the atmosphere. It exerts a solvent effect on many rocks and enters into their crystalline structure; by virtue of its solvent action on CO₂ in the atmosphere, this effect is increased, and all natural W.s contain matters in solution. (For composition of oceanic W.s. see OCEAN.) Calcium and magnesium bicarbonates, calcium chloride, and sulphate are the cause of hard W. The dissolved air in all natural W. is indispensable for life in W. The presence of air and salts is beneficial in W. for domestic use: the presence of organic matter is injurious; for drinking, W. should have no solvent action on the lead pipes, or contain much magnesium salt, nor should it be soft. The presence of organic matter allows W. to be the home of injurious germs, and it is thus the vehicle in the spread of some diseases. It is usual to analyse drinking-W. chemically and bacteriologically. Filtering is useful chiefly as holding back organic remains; boiling renders it much more harmless, if not totally so, only a few probably harmless spores being able to resist the temp. Drinking-W. is often sterilised by treatment with chlorine, the excess chlorine being afterwards removed by addition of ammonia or filtration through active carbon.

See J. P. Partington, *Composition of Water*, 1928. See also WATER MEASUREMENT; WATER-SOFTENING; WATER SUPPLY.

Water-beetles, see DYTISCIDAE.

Water-Boatman, see BOAT-FLY.

Water-cloak, see CLEPSYDRA.

Water-colours, pigments transferred from the cakes in which they are prepared to the paper or other painting-surface by suspension in water. The various colours are sometimes supplied in hard cakes, in which case they have to be ground by rubbing on a palette and mixed with water to the desired consistency.

A convenient form is that of fairly soft cakes in china pans prepared by mixing the colour substance with a slowly drying gum. Another popular form is prepared by adding a small quantity of glycerine, which results in a moist colour suitable for storage in collapsible tubes. Variations of tint are obtained in the case of opaque pigments by mixing the colours in the right proportions. With transparent colours, beautiful effects are obtained by superimposing thin washes.

In the 18th cent. water-colour painting became a separate art, developing from the tinted drawings of the period. It has become a peculiarly Eng. art, possibly because it is especially suited to landscape and is an admirable medium to render atmospheric effects. Gainsborough used the medium, and Sandby and the Cozens, father and son, are among the earliest of Eng. water-colour painters. Those of the greatest importance who lived at the end of the 18th cent. are John Sell Cotman, one of the best of the Norwich School, and distinguished by his broad treatment of masses, J. Crome, also of the Norwich School, T. Girtin, P. de Wint, Turner, master of atmosphere, who successfully combined various methods of water-colour painting, Constable, D. Cox, F. Towne, J. Varley, R. P. Bonington, and also, but individual in subject-matter, Blake and Rowlandson. In the course of the 19th cent. water-colour painting declined, becoming over-burdened with detail, but in the 20th cent. the art has recovered its vitality in the work of Sargent, Steer, Rich. Paul and John Nash, Edward Bawden, Eric Ravilious, John Piper, David Jones, and Edward Pitchforth. *Gouache*, a method of water-colour painting with opaque colours mixed with gum and honey, was used by Paul Sandby and others; also by a number of our contemporary artists, including Edward Burra and Michael Avton. A Royal Society of Painters in Water-colours was founded in 1804. See E. B. Lintott, *The Art of Water-colour Painting*, 1926; H. M. Cundall, *History of British Water-colour Painting*, 1929; L. Richmond and J. Littlejohns, *The Technique of Water-colour Painting*, 1931, 1948; L. Binyon, *English Water Colours*, 1944; I. Williams, *Early English Water Colours*, 1952.

Water-cress, see CRESS.

Water-culture, see HYDROPONICS.

Water Cure, see HYDROTHERAPY.

Water Divining, see DIVINING ROD.

Water-dropwort, see WATER HEMLOCK.

Water-fleas, see CLADOCERA.

Water Gas, see GAS MANUFACTURE.

Water Glass, see SOLUBLE GLASS.

Water Hawthorn, see APONOGTON.

Water Hemisphere, see OCEAN AND OCEANOGRAPHY.

Water Hemlock, Cowbane, or Dropwort, (*Oenanthe flutulosa*), tall, umbelliferous perennial, growing in damp places, bearing large umbels of white flowers. Its turnip-shaped root is poisonous.

Water-lily, name given to the various species of Nymphaea and Nuphar and also of Nelumbo, all belonging to the family

Nymphaeaceae. Britain produces white (*Nymphaea alba*) and yellow (*Nuphar lutea*) W.s, which are found floating in still waters.

Water-mark, design impressed into paper (q.v.), first invented at Fabriano in Italy. At the last stage of the progress of the pulp over the wire gauze a wire mesh cylinder, called the 'dandy roll,' carrying the design, impresses this into the pulp, producing the W.

Water Measurement. The flow of water is measured most accurately by recording the time taken to fill a vessel of known proportions. Very large flows of water, e.g. in rivs., can be measured with moderate accuracy by finding the average velocity in a section of channel of known cross-sectional area. The velocities are measured by recording the movement of floats, or by the use of current meters. As the velocity is higher at the surface and in the centre than near the bottom or sides of the stream, recordings have to be taken in sev. positions and averaged.

Flows can be estimated, roughly in the case of rivs. or with fair accuracy in the case of pipes or channels constructed of specified materials, by recording the hydraulic gradient, or loss of head due to friction per unit length, and calculating the flow from various formulae, some of which take the form

$$V = K m^{\alpha} i^{\beta}$$

where: V = velocity in ft per sec.; m = hydraulic mean depth, i.e. cross-sectional area of flow divided by wetted perimeter, in ft; and i = the fall divided by the length. The values of the constant K and of the indices α and β all vary according to the material of which the channel is constructed.

Where practicable, flows in rivs. and open channels are measured by recording the depth of flow over weirs of known proportions. Sev. types of weir are used, including V-shaped, rectangular, and trapezoidal weirs constructed of sharp-edged metal plates; suppressed weirs, consisting of a sharp-edged plate arranged across vertical-sided channels; and simple broad-crested sills, such as brick, masonry or concrete walls. Precautions have to be taken that the velocity of approach to a weir is not excessive. Accurate measurements of head over a weir are made with the aid of a hook-gauge, which is a hook so arranged that its point approaches the surface of the water upwards. When the point of the hook breaks the surface this becomes immediately obvious and the level of the point, relative to crest of weir, is read on a vernier scale. Flows are also recorded graphically by floats which actuate clock-controlled instruments. Flows of water containing heavy silts are best measured through standing-wave flumes, which are constrictions in open channels. The formula applicable to flat-crested weirs serves also for these.

Velocity in pipes or channels can be recorded by the use of Pitot tubes, which are small-diameter tubes arranged with their ends to face the flow so as to re-

convert velocity head into pressure head. Nozzles incorporating Pitot tubes are often used by fire brigades for recording the discharges of hydrants.

The Venturi Flowmeter is an instrument applicable to the measurement of moderately large flows through pipes. It consists of a constriction in the line of pipe which causes a local increase of velocity and corresponding reduction of pressure. (see HYDROKINETICS). Pressure is measured above the constriction and at the constriction. The Brit. Standard formula for computing the flow reads:

$$Q = 0.0557 aC \sqrt{\frac{H}{n^5 - 1}}$$

where Q = discharge in cubic ft per sec.; a = area of the upstream entrance to the meter in sq. in.; C = coefficient of discharge (= approximately 0.98); H = differential head in ft of water; n =

Area of Venturi tube at upstream
Area of throat
where D_1 = upstream diameter, and
 D_2 = throat diameter.

Supplies of water, e.g. to premises, are usually recorded by meters either of the inferential or positive types. In each case the total flow 'to date' is recorded on a dial. An inferential meter consists of a small turbine which is driven at varying rates according to the rate of flow: it is liable to be inaccurate at very small flows. A positive meter involves a piston moving in a cylinder, the number of strokes of the piston being in direct relation to the quantity of water displaced. See also HYDROKINETICS. See A. A. Barnes, *Hydraulic Flow Reviewed*, 1916; F. C. Lea, *Hydraulics*, 1926; *British Standard Specification No. 722 for Borehole and Well Pump Tests*, 1937; *British Standard Specification No. 723 for Sewage Pump Tests*, 1937; E. Dixon Grubb, *Simple Hydraulics for Firemen*, 1941; S. Crimp and W. E. Bruges, *Tables and Diagrams for Designing Sewers and Water Mains*, 1949; *The Contractors' Record Hydraulic Diagrams 1 and 2*, 1949.

Water Melon, or *Citrullus vulgaris*, plant (family Cucurbitaceae) with yellow flowers followed by large, round fruits which are cultivated in tropical countries and sometimes grown in greenhouses in Britain. In the U.S.A. the W. M. is an important crop in the S. states. The fruit, which has a green rind, often grows to 2 ft in length, and when ripe the meat inside is a rosy red and very sweet, particularly when feed.

Water on the Brain, see HYDRO-CEPHALUS.

Water-Ousel, see DIPPER.

Water-parting, see WATERSHED.

Water Plants, see AQUATIC PLANTS.

Water Polo, game which originated in England about 1880 and is now played universally. There are 7 players in each team—a goalkeeper, 2 backs, 1 half-back, and 3 forwards, who endeavour to score goals by throwing a ball (like a football in size and construction) into their opponents' goal.

The governing body of the game is the Amateur Swimming Association, and the game is played in swimming-pools which will accommodate a playing pitch with the following dimensions: length, minimum 20 yds, maximum 30 yds; width, minimum 8 yds, maximum 20 yds; depth, minimum 3 ft; distance between goal-posts 10 ft; crossbar in deep water, 3 ft above water surface; crossbar in shallow water, 8 ft from floor of playing space.

The duration of each game is 35 min., divided into halves of 15 min. with a 5-min. interval. It is controlled by a referee on the bath side.

Water-rail, see RAIL.

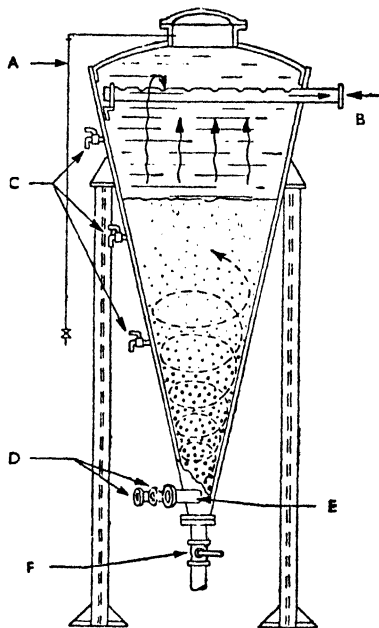
Water Rights, see RIVERS, Law Relating to Rivers; Riparian Rights. See also PUBLIC HEALTH; TERRITORIAL WATERS; WATER SUPPLY.

Water Scorpion, hemipterous insect or bug (*Nepa cinerea*) found in ponds and stagnant waters in Britain. It has curved forelegs and a tail-like appendage or breathing tube to the abdomen which give it somewhat the appearance of a scorpion.

'Water-Snake,' see HYDRUS; HYDRA (constellations).

Water-softening. Hardness of water is due to the presence of calcium sulphate, and the bicarbonates of calcium and magnesium (the latter being responsible for temporary hardness, which can be removed by boiling); these do not lather with soap, which is decomposed, insoluble salts of calcium and magnesium being formed with the fatty acids. In addition, the formation of 'fur' or scale in boilers and kettles by deposition of soluble matters is a great disadvantage. The methods for rendering hard water soft are: (1) By the addition of washing soda or of ammonia. In this way calcium carbonate is deposited, $\text{CaSO}_4 + \text{Na}_2\text{CO}_3 = \text{CaCO}_3 \downarrow + \text{Na}_2\text{SO}_4$, $\text{Ca}(\text{HCO}_3)_2 + 2\text{NH}_4\text{OH} = (\text{NH}_4)_2\text{CO}_3 + \text{CaCO}_3 \downarrow + 2\text{H}_2\text{O}$. This method is often employed in the household. (2) By the addition of the requisite amount of milk of lime, which removes temporary hardness, $\text{Ca}(\text{HCO}_3)_2 + \text{Ca}(\text{OH})_2 = 2\text{CaCO}_3 \downarrow + 2\text{H}_2\text{O}$. The precipitate is allowed to settle. This does not remove the sulphate; for this purpose sodium carbonate is added, the Ca being precipitated as carbonate, the sodium sulphate formed being soluble and innocuous. It is usual to supply the lime in defect rather than in excess, though a slight excess is claimed to have bactericidal effect. Commercially, the process is carried out by adding a controlled amount of lime and soda emulsion to the hard water, allowing the mixture to settle in a reaction tank, and filtering the resultant softened water to eliminate traces of precipitate which are not removed by settlement. In the Precipitator type of lime-soda softener, hardness removal is achieved by allowing the water to flow upwards through a zone of precipitate retained in hydraulic suspension; this method produces a clear, softened water which often requires no additional filtration. In the 'Spiractor' pressure lime softener the precipitated calcium carbonate is induced to crystallise

on grains of catalyst, the particular advantage being that all precipitate forms in hard, easily handled granules instead of as bulky, wet salt. (3) By the base-exchange process. A base-exchange water softener consists of a closed steel vessel containing granular base-exchange material through which the hard water is passed. This base-exchange material has the property of absorbing the calcium and magnesium hardness salts from the water and of exchanging them for an equivalent amount of harmless soda salts. This



WATER-SOFTENER: 'PERMUTIT' SPIRATOR

A, air vent; B, softened water outlet; C, test cocks; D, chemical inlets; E, raw water inlet; F, draw-off valve for enlarged catalyst.

softening action continues until the base-exchange material contains no more exchangeable sodium: when this stage is reached the softener is regenerated by flushing with a small amount of solution of common salt (NaCl). During regeneration, soda from the brine is taken up by the base-exchange material, and the calcium and magnesium previously absorbed are rinsed away to the drain.

Water Spaniel, Irish, see SPANIEL.

Water-spout, funnel cloud very similar to a tornado (q.v.), except that it occurs at sea and is normally not quite so violent. It is formed in a similar way to the tornado beneath a cumulonimbus cloud in the

transition zone between warm, moist and dry air masses, although it can occur without a change of air mass in convectively unstable air that has absorbed in the lower layers large quantities of moisture from warm seas. The instability is increased by the cooling of under-running dry air by evaporation into it of rain from above. The funnel of the W. may be of any diameter from 20 to 200-300 ft and raises a small cloud of spray where it meets the sea. The life of a W. is rarely more than 1 hr.

Water Supply. Water has always been considered one of the prime necessities of life. The Rom. aqueducts and baths are unsurpassed in splendour, but they are an isolated phenomenon. Hot baths were introduced from the E. and communal bath-houses were in use on the Continent throughout the Middle Ages. Bath-houses were built in England at country mansions about 1660, indoor baths began to be installed, and in 1778 Joseph Bramah patented the modern form of water closet.

But recognition of the importance of cleanliness as a preventive, and of contamination of water as carrier of disease had to await the discoveries of Lister and Pasteur, and the provision of ample supply of wholesome water became possible only after the development of bacteriological technique. The outbreak of cholera in 1831-3 directed public attention to the question of water pollution, and in 1842 a parl. commission was appointed to inquire into the state of W. S.s. Of 50 large tns examined, 6 were found to possess good W. S., in 13 it was indifferent, in 31 inadequate or impure. In Birmingham 4 out of 5 houses, in Newcastle 11 out of 12, had no water. After the third cholera epidemic (1865-6) a Royal Commission was set up to investigate the state of public health and pronounced the supply of pure water necessary 'for civilised social life.' It is Disraeli's Public Health Act (1895) and Joseph Chamberlain's work during his mayoralty of Birmingham (1873-6) which mark the beginning of modern improvements in sanitation, putting public health in the forefront of State responsibilities and making it incumbent on public authorities to see that every dwelling-house has an adequate supply of wholesome water within reasonable distance. In Great Britain, 70 per cent of the pop. obtain their W. S. from public authorities, 15 per cent from private companies, and 15 per cent from local wells or other sources (1950).

Quantities. The quantity of water consumed per head of pop. varies considerably, from less than 5 gallons per head of pop. per day in some outlying localities, to over 100 gallons in parts of Scotland. In America demands of more than 100 gallons per head per day are not uncommon. In Great Britain the demand is most often in the region of 25 gallons per head per day for domestic purposes only, and 30 gallons per head per day including trade demands. These figures make no allowance for the private supplies owned by many factories. In the design

of new W. S. systems, it is usual to allow 12½ gallons per head per day for vills., 25 gallons for country tns and residential areas, and 30 gallons upwards for larger tns.

Sources of Supply. Supplies of water for domestic and other purposes are obtained from either surface or underground sources. Surface sources, which include the run-off of upland catchments, intake from rivs., and natural lakes, and collection from artificial impervious areas (e.g. roofs), usually afford waters which are soft, i.e. containing little dissolved mineral matter. Underground sources from springs and deep wells are liable to be hard. Riv. waters, shallow wells, and some springs are liable to organic and bacteriological pollution. In Great Britain the majority of upland catchments are in the N. and W. areas, where the geology is such that it renders collection of surface run-off and storage in impounding reservoirs comparatively easy. Wells are more common in the E. and SE. owing to the prevalence in those regions of water-bearing strata. The type of source to be selected depends on the value of the available sources, their positions, and the quantity of water required. Very large supplies are usually taken from catchments, either upland or lowland; wells will serve for small supplies and for some tns, but an individual well will seldom give an adequate supply for a large pop. Thus, supplies to small communities are local, but supplies for large tns may be brought from considerable distances.

The distribution of water in the strata of England may be generalised as follows. The clays, gault, Upper Lias, and New Red Marl are non-water bearing; limited supplies are obtained from Purbeck Beds and Lower Lias; from the gravels, crags, and sands the water is subject to pollution and often contains iron, but good supplies are obtainable from the Reading Beds and Thanet sands. Chalk, Upper and Lower Greensand afford a practically unlimited supply of good, pure, but hard water, which applies also to calcareous grit, oolites, magnesian limestone, and mt limestone. Good supplies are obtained from Portland rock, Middle Lias, New Red Sandstone, Old Red Sandstone, slate, and granite. Millstone Grit gives excellent water in abundance; the coal measures also provide much.

Water Treatment. Water as collected requires treatment, owing to the suspended and dissolved solids and living organisms which it contains. The first process of treatment is usually sedimentation, to remove suspended matter, and in some cases this may be combined with the water-softening process. Remaining sediment, including a large proportion of the bacteria present, is removed by filtration. The method which is known as slow sand filtration is being largely superseded by the use of mechanical filters or pressure filters, which are closed steel vessels containing the filter medium. The water, dosed with coagulant, enters the shell at the top and passes downwards through the graded medium at a rate of

filtration often as high as 100 gallons per sq. ft per hr. The filter is cleaned periodically by agitation or injection of compressed air.

Sedimentation and filtration remove suspended solids and an appreciable proportion of the bacteria present in the raw water. Dissolved solids are removed by softening processes. (See WATER SOFTENING.) It is now usual to render all waters bacteriologically sterile by the application of chlorine, chlorine and ammonia (chloramine process), or, less frequently, ozone. After complete treatment water is kept in covered reservoirs so as to exclude light, which would encourage vegetable growth. This storage, which gives time for chlorine to act, usually takes place in the service reservoirs which are part of the distribution system.

Reservoirs. When water supplies are taken from surface sources, in particular upland catchments, storage reservoirs are necessary to overcome periods of drought. These are of very great capacity, e.g. 6 months water demand. (See RESERVOIRS.) When water is drawn from underground sources reliance is placed on the natural underground storage (referred to as the underground reservoir), and no reservoirs have to be constructed other than the small-capacity service reservoirs which form part of the treatment and distribution system and which hold in the region of 2 or 3 days' supply only.

Water Distribution and Provision for Fire Fighting. Water distribution systems are made to take at least 3 times the average daily demand, in order to allow for peak demands and reduction of pipe capacity by incrustation. Water must be supplied between reasonable limits of pressure, so as to be adequate for fire-fighting purposes and to reach the tops of high buildings. For fire fighting the pressure should not be less than 45 lb. per sq. in. when the demand from the hydrant is about 200 gallons per min. This rough rule ensures sufficient pressure for ordinary fire fighting without the aid of a mobile pump and sufficient quantity to keep a mobile pump supplied should the latter prove necessary. On the other hand, pressure in the mains should as far as practicable be kept below 100 lb. per sq. in. because not only do high pressures cause water-hammer and damage to household pipes and fittings, but they necessitate heavier classes of main. These limits of pressure necessitate that water shall be supplied in 'zones,' low-lying areas being served from low-level service reservoirs, and high-level areas from high-level reservoirs. Areas are sometimes served by pumping only and pressure reduced as necessary by automatic pressure-reducing valves. Water towers are small service reservoirs erected above ground level. Water is delivered to the areas to be served by trunk mains. Properties are not served directly from these trunk mains, but by means of networks of service mains, each of which connects to a trunk main at one point only. The networks of service mains are broken up into sections with the aid of a system of

valves, which renders possible the isolation of short lengths for maintenance purposes. It is seldom that a main of less diameter than 4 in., unless of very short length, will give the aforementioned quantity and pressure for fire-fighting purposes. Thus, in some dists., all distributing mains have been made 4 in. internal diameter or larger. Smaller sizes are used in rural areas. When new mains are proposed, the fire authority (co. or co. bor.) must be informed, and they can insist on increased dimensions and the provision of hydrants, etc. The additional cost falls on the fire authority.

Water mains consist of cast-iron pipes, or, more rarely, asbestos-cement pressure pipes, laid with at least 3 ft of cover, to protect them from frost or damage. Air valves are placed at all high points on the system to release air and thereby prevent air-lock, and wash-out valves at all low points. Fire hydrants are placed at intervals not exceeding 200 yds, and closer as may be justified by the fire risk. Calculation of flow through pipes is made in accordance with sev. accepted formulae. (See WATER MEASUREMENT.)

Statutory Powers. The power to supply water in England and Wales is vested in various bodies, namely, water companies and individuals, acting either under a local Act or a Provisional Order, or under powers given by the general law without the special powers conferred by such Act or Order; local authorities acting as or in default of water companies; joint water boards formed by uniting 2 or more urb. or rural dists. into a united dist. for a common W. S.; and (for London), the Metropolitan Water Board (q.v.). Generally speaking, prior to the Public Health Act, 1936, the W. S. of rural dists. was regulated by the Public Health Act, 1875, and the Public Health (Water) Act, 1878, the supply being under the authority of the rural dist. council as the rural sanitary authority.

Under the Water Act, 1945, the minister of health is assigned the general duty of promoting the conservation and proper use of water resources and securing the effective execution by water undertakers of a national policy relating to water, and to this end he is required to appoint a central advisory committee for the purpose of advising him on these matters and on the operation of legislation concerned with W. S. To secure better W. S. or water conservation in given areas the minister may set up joint advisory water committees representative of water undertakers and local authorities in the areas concerned. He is also empowered to require local authorities and statutory water undertakers to carry out surveys and formulate proposals relating to W. S. as well as to require records and information from persons abstracting water from any source.

Under the Public Health Act, 1936, the minister was enabled, on application being made to him, to create joint water boards for united dists., but this he may now do without the need for prior application. Where it is expedient for securing a more

efficient W. S., the minister may make orders, operating by agreement or by compulsion, for the combination or amalgamation of water undertakers or the transfer of water undertakings. On complaint or otherwise, the minister may order an investigation to ascertain whether any local authorities, joint water boards, or statutory water undertakers have failed to provide an adequate W. S., and in the event of sustained default on the part of a water undertaker the minister may transfer to himself or, in certain cases, to the co. council of the area, the powers of the body in default. As to conservation of water resources, all by-laws for preventing the waste or contamination of water require the confirmation of the minister and have a maximum duration of 10 years. Apart from by-laws there is statutory provision making it an offence to pollute any spring if the water from it is used or likely to be used for human consumption or domestic purposes. Part IV of the Water Act, 1945, enables the minister to make orders conferring on 'any persons who are or propose to become statutory water undertakers' authorising them to construct, alter, and maintain waterworks, to supply water in any area, and to raise capital for such purposes and to acquire land or water rights either compulsorily or by agreement. The Act imposes a duty on the undertakers of giving a W. S. on reasonable terms and conditions for non-domestic purposes, such as to farmers and industrialists, but there is a limit to this duty where its performance would prejudice existing obligations to supply water, by entailing unreasonable expenditure in constructing new waterworks. The Act also makes provision for requiring statutory water undertakers to lay water mains in advance of the development of a housing site. Other provisions in the Act enable the minister to revise water rates and charges and empower water companies to issue redeemable stock. The Rural Water Supplies and Sewerage Act, 1944, authorises the minister of health to make contributions towards the expenses incurred by local authorities on approved works in providing or improving water supplies in rural localities (and in making adequate provision for sewage disposal).

See also ARTERIAN WELLS; FILTER; IRRIGATION; MUNICIPAL TRADING; PUMP; RAIN; RESERVOIR; RIVER; SEWAGE; WATER MEASUREMENT; WATER SOFTENING. See F. E. Turneaure and H. L. Russell, *Public Water Supplies*, 1924; A. P. Folwell, *Water-Supply Engineering*, 1925; P. M. Parker, *Control of Water*, 1925; W. T. Taylor, *Practical Water Power Engineering*, 1925; J. E. Dumbleton, *The Construction of Wells and Boreholes for Water Supply*, 1928; W. K. Burton, *Water Supply of Towns*, 1929; D. M. Baker and H. Conkling, *Water Supply and Utilisation*, 1930; G. V. James, *Water Treatment*, 1949; L. B. Escritt and S. F. Ritch, *The Work of the Sanitary Engineer*, 1949; Institution of Water Engineers, *Manual of British Water Supply Practice* (2nd ed.), 1954.

Water Table, the upper surface of the zone within which the rocks of the earth's crust are completely saturated with water. The W. T. shows gentle undulations reflecting in a more subdued form the surface topography. Its distance from the surface varies according to the climate. In desert regions the W. T. may be at a depth of 100 ft or more. In wet climates it may rise above the surface of valleys and low-lying areas and give rise to areas of permanent swamp. In any dist. the position of the W. T. varies from an upper level reached after periods of heavy rain to a lower level reached in periods of drought. Wells which do not penetrate below the zone of intermittent saturation enclosed by these two limits are liable to run dry.

Water-tight Compartments, see SHIPS AND SHIPBUILDING.

Water Wheels, the earliest form of prime mover utilising the energy of water falling from a high to a lower level. The difference between the levels is known as the 'head.' The overshot wheel has a diameter slightly less than the head, water is led on to the highest point through the 'headrace' and fills the 'buckets,' usually formed by flat staves set in the cylindrical surface of the wheel. The buckets in the side near the reservoir being empty, the wheel turns under the weight of water in the far side. In the breast-wheel water is led into buckets on the near side about the height of the axis. To prevent loss of water, the loaded part of the wheel moves in a close-fitting channel and the buckets are shaped to hold as much water as possible until they reach the lowest point. Both these types of W. W. move under the weight of water, they utilise the potential energy; any kinetic energy of the entering water is wasted, and the water should enter at slow speed. In the undershot wheel water enters the buckets at a point below the axis, and it is the reaction of the bucket to the streaming water, i.e. the kinetic energy, that is utilised. The buckets are so shaped that the water moves smoothly, without impact. The Pelton Wheel (see HYDRO-ELECTRIC POWER) moves under the impact of a jet of water under high pressure.

Waterbearer, see AQUARIUS.

Waterbuck, see ANTELOPE.

Waterbury, city of New Haven co., Connecticut, U.S.A., on Naugatuck R., 18 m. NNW. of New Haven. One of the chief manufacturing cities of the state, it produces clocks and all kinds of metalware and the noted 'W. watches.' Hardware, chemicals, clothing, tools, automobile parts, lighting fixtures, plastics, bedding, and cigars are also manufactured. W. is the centre of a brass industry. Pop. 104,480.

Waterfalls are typical of regions where streams are young or immature, not having had time to grade their courses. Tributaries gathering less water often fall into rivs. of larger volume, erosive action being less in the former. Falls are numerous where coastal plains of younger and poorly resistant strata are

crossed by older rivs.; a *fall-line* exists along the inner margin of the coastal plain adjoining the older land. Most W., however, are due to rivs. crossing strata of different degrees of resistance, the valley in softer rock being deeper than that in the harder. W. work themselves backward through the hard rock, chiefly by undermining at the base; in the case of the Niagara and Zambesi, narrow gorges with dangerous currents occur between the present and original sites of the falls. Some of the most picturesque W. are formed by springs issuing from cliff-walls in mountainous regions. Among famous W. are Niagara; Victoria, Rhodesia; Yosemite, California; Sutherland, New Zealand; the Staubbach, Alps; Ignassu, Argentina; Kaletur, Brit. Guiana; Tequendama, Colombia. W. have been used to generate power by means of water-wheels (q.v.) for cents.; turbines are replacing them and are particularly used for generating electricity. (See also HYDRO-ELECTRIC POWER.)

Waterford: 1. Co. of the Rep. of Ireland, bounded on the N. by Kilkenny and Tipperary, S. by the Atlantic, E. by Waterford Harbour and Wexford, and W. by Cork. In the 10th cent. W. was inhabited by the Danes, of whom there are numerous relics. At Lismore there is a historic castle, the Irish seat of the Duke of Devonshire, at Ardmore 7th-cent. monastic remains and a holy well, and at Cappoquin there is a Trappist monastery (1830). The coast-line is much indented, the prin. inlets being W. Harbour, Tramore Bay, Dungarvan Harbour, Ardmore Bay, and Youghal Harbour. The dists. to the N. and NW. are mountainous, the chief ranges being the Comeragh and Monavallagh Mts (2597 ft), the Knockmealdown Mts (2609 ft), and the Drum Hills (990 ft) in the SW. The prin. rivs. are the Suir and the Blackwater, famous for the salmon fishing. Agriculture is successfully carried on, but the greatest area is under pasturage, and the rearing of livestock is important. The fisheries form one of the chief industries, and there are breweries, distilleries, and flour mills. Marble and copper are found. The chief tns are W., Dungarvan, and Lismore. The co. returns 4 members to the Dail Eireann. Area 709 sq. m.

2. Municipal, parl., and co. bor., city, and cap. of Co. Waterford, Rep. of Ireland, on the R. Suir. W. was occupied by the Danes in AD 853 and wrested from them by Strongbow in 1170. Henry II visited W. the following year. Prince John landed there in 1185, and afterwards as king in 1211. W. received its first charter from him in 1205. James II sailed from Duncannon Fort on the Wexford side of W. Harbour for France after the battle of the Boyne, and William sailed from there to England. During the Civil war W. was taken by Ireton. A modern bridge connects it with the suburb of Ferrybank on the N. bank of the riv. It has Protestant and Rom. Catholic cathedrals. Fragments of the old city walls remain, notably Reginald's Tower, dating from the 11th cent. A large ex-

port trade is carried on, especially in bacon, butter, and cattle, and other industries are flour-milling, brewing, paper and board, and electrical equipment. Glass-making, for which W. was once famous, has been revived. The harbour is formed by the estuary of the Suir and Barrow. There is steamer communication with Fishguard, Glasgow, Liverpool, Bristol, etc., besides the other Irish ports, among which it ranks second. Pop. 28,500.

Waterhen, or Moorhen (*Gallinula chloropus*), common bird of the order Rallidae (rails), frequenting slow rivs., streams, lakes, and ponds, and though not web-footed an active diver and swimmer. Though black and white apparently from a distance, the plumage has many hues. The nest is built by the waterside, and the eggs are reddish-white with orange-brown spots. It is found in Europe, N. Africa, N. and S. America, and N. Asia.

Waterhouse, Alfred, R.A. (1830-1905), architect, b. Liverpool, began practice 1853. He won competitions for the Manchester Assize Courts, 1859, and for the Manchester Town Hall, 1868, both designed in the Gothic style. Among the chief buildings in his enormous subsequent practice were the Natural History Museum, the National Liberal Club, the New University Club, St Paul's School at Hammersmith, the City and Guilds College at Kensington, the Prudential Assurance Co's head offices, Univ. College Hospital—all in London; the Metropole Hotel, Brighton; and the univs. of Manchester, Leeds, and Liverpool. He favoured the Romanesque style, and used terracotta freely. He was President R.I.B.A. 1888-91, and was succeeded in that office by his son Paul (1921-3) and his grandson Michael (1948-50). He was awarded the R.I.B.A. Royal Gold Medal in 1878.

Waterloo, vil. situated 9 m. S. of Brussels, chosen by the Duke of Wellington, from its strategic position relatively to the line of the fortresses on the N. frontier of France, as the most advantageous place to resist the advance of Napoleon on the Belgian cap. in 1815. Napoleon crossed the Belgian frontier and fighting began on 16 June, as the Prussians contested his advance to gain time for the concentration of the main Allied forces. Simultaneous engagements at Ligny and at Quatre Bras followed Napoleon's decision to attack the Allies separately. Neither was decisive, largely owing to the contradictory orders which caused D'Eriens's corps to take part in neither. The Prussians then retreated, but to the N., and not to the E., in which direction lay their line of communications; this was to have an important result, since Napoleon's aim was to defeat Wellington before Blücher could join him. Detaching Grouchy to follow the Prussians, Napoleon advanced with his main body on Wellington's defensive position at W., which Ney had allowed him to reach unmolested. The Duke learned during the night of 18-19 June that Blücher could support him, and determined to stand and fight.

His forces consisted of 49,608 infantry, 12,402 cavalry, 5645 artillery with 166 guns (of which total, scarcely 24,000 were Brit.). Napoleon had 48,950 infantry 15,765 cavalry, 7232 artillery with 246 guns.

Wellington took up a characteristic defensive position, using a low ridge as a screen for his main body. The Guards occupied the outlying farm of Hougoumont on the right, and the King's German Legion that of La Haye Sainte in the centre. The battle opened at 11.30 a.m. with a Fr. attack on Hougoumont; Napoleon's decision to break his enemy's centre instead of turning his left removed the last hope of separating the Allies. At 1.30 p.m. Bülow's corps were seen advancing, and a force was sent to hold them off; thus the effect of Blücher's manoeuvres was early felt. An attack was launched on Wellington's centre, and on La Haye Sainte. A Dutch-Belgian brigade broke, but no decisive effect was produced, and a charge of the 'Union' cavalry brigade (Royals, Scots Greys, and Inniskillings) swept away the Fr. infantry before itself being driven back. Another attack on La Haye Sainte failed, and a heavy artillery fire was opened. Fr. cavalry charges then broke against the infantry squares. About 4.30 p.m. further Fr. forces, including the Young Guard, were sent against Bülow, who was temporarily forced back. About 6 p.m. the remnants of D'Erlon's corps succeeded in capturing La Haye Sainte, but Wellington reformed his line, being enabled to reinforce his weakened centre by the advance of Zielen's Prussians towards his left. Napoleon then launched another general attack, including his Guard, but was repulsed. As the Guard fell back at 8 p.m. Zielen broke into the N.E. sector of the Fr. line; Wellington set his whole force moving and the Fr. Army disintegrated, the Prussians taking up the pursuit. The casualties were heavy; the French lost over 40,000, and the Prussians 7000, and Wellington over 15,000. See K. von Clausewitz, *Campagne de 1815*, (1835, Fr. trans. 1899); J. S. Kennedy, *Battle of Waterloo*, 1865; Sir E. Creasy, *The Fifteen Decisive Battles of the World*, 1887; A. F. Becke, *Napoleon and Waterloo*, 1914; Wellington, *Dispatches and Memorandum on Waterloo* (ed.), 1844-7.

Waterloo, City, co. seat of Black Hawk co., Iowa, U.S.A., on Cedar R. in agric. area 52 m. NW. of Cedar Rapids, with railway shops, meat-packing plants, and soybean processing. It manufs. farm machinery, cement mixers, foundry, concrete, and wood products. It is the site of the annual Dairy Cattle Congress and National Belgian Horse Show. Pop. 65,200.

Waterloo, city of Ontario, Canada, 50 m. NW. of Hamilton. Footwear, brushes, hardware, and furniture are made. Pop. 14,050.

Waterloo Bridge. The original 9-arched bridge between Blackfriars Bridge and Charing Cross was built by Sir John Rennie (who also built London Bridge) 1811-17. It was the oldest existing Lon-

don bridge crossing the Thames before being demolished and replaced by a new bridge designed by Sir Giles Gilbert Scott (q.v.), and opened in 1944.

Waterloo Cup, The, see COURSING.

Waterloo-with-Seaforth, once an urb. dist. of Lancs, England, now part of the bor. of Crosby, on the Irish Sea at the mouth of the R. Mersey. W. is a residential suburb to the NW. of Liverpool. For pop., see Crosby.

Watermaal-Boitsfort (Flem. **Watermaal-Bosvoorde**), suburb of Brussels, Belgium, SE. of the city. Pop. (1955) 22,300.

Waterproof Compositions. Prior to 1946, continuous-film waterproofing compositions for fabrics comprised mainly drying oils (e.g. 'boiled' or blown linseed or tung oils), drying oil varnishes, natural or a very limited range of synthetic rubbers and celluloses. Where the proofed fabrics were required to 'breathe,' rotproofing and/or showerproofing impregnants like cuprammonium solutions and metallic soaps were used. Many of these compositions still pertain, in improved forms, but rapid advances in high-polymer chemistry have led to new synthetic compositions, some of which have almost entirely replaced the older media.

Oilproofing, by impregnation and machine or hand-coating for foul-weather clothing and covers and by surface spreading for table baize and leather-cloths, is now practised only to a limited extent. The main replacements are vinyl resins—polyvinyl chloride ('P.V.C.' for short) or polyvinyl co-polymers. Their films are more tough and stable. They possess high abrasion and flex-cracking resistances in arctic, temperate, and tropical climates, they are more chemically resistant, and they do not develop stickiness with humid ageing. They are thermoplastic and can be calendered, embossed, and welded, and they can be processed without the use of thinners. The compositions are prepared by mixing the dry, powdered polymer with suitable softeners or plasticisers, e.g. tritolyl or trixylyl phosphates, diethylhexyl or dialphanyl phthalates or Dioctyl sebacate. Heat stabilisers, like white lead or metallic stearates, and pigments are added. The mixes are applied to fabrics by dipping and/or surface coating and calendering and momentarily heating to about 177° C (350° F) in order to fuse the coatings into homogeneous films. Garments or other articles made from the finished fabrics are cut and machine sewn, and the stitched seams are welded and rendered proof by means of electronic welding machines.

P.V.C. films are also produced in unsupported sheet form, i.e. without a fabric base. The plastic is extruded and/or calendered and fused and given attractive 'grains' or printed finishes. Other plastic sheet materials include polyethylene, polyamides (e.g. nylon), polyethylene terephthalate ('Terylene'). Oilproofing of silk, cotton, spun and continuous-filament viscose rayons, nylon, 'Terylene,' and glass fabrics is still done

by mechanical dipping and vertical tower stoving, but a wide variety of synthetic or modified synthetic proofing media is now employed, e.g. oil-modified alkyls, phenolic, coumarone, maleic, urea, melamine, epoxy and acrylic resins, polyurethanes, silicone resins, and silicone rubber.

Waterproofing of fabrics by rubber coating remains an active industry. Natural rubber is compounded with vulcanising and accelerating chemicals, anti-oxidants, colours and fillers, made into a dough with a rubber swelling solvent, e.g. solvent naphtha or benzene, and applied on spreading machines to fabrics. The fabrics may be coated on one side (single texture) or on both, or 2 layers of coating fabric may be doubled together, rubber to rubber (double texture). The proofed material is finally heat vulcanised. In addition to rubber, chlorinated rubber and a widening range of synthetic rubbers are employed in coating. These generally provide increased oil and chemical resistance where required.

Showerproofing is practised for rain-coats, etc., and tent and cover fabrics. In addition to the basic processes, which, in the case of metallic soaps, do not withstand dry-cleaning, a number of resins and other chemicals which react on the fabric surfaces and are more permanent are available, as are also silicone water-repellents.

Watershed, Water-parting, or Divide, in physical geography, the line of separation between the basins of 2 adjacent rivs., lakes, or drainage-valleys, or between 2 drainage systems, the natural boundary of a basin, from which streams flow in opposite directions.

Waterton National Park (Canadian Section), situated on the SW. corner of Alberta (q.v.), along the E. slope of the Rocky Mts (q.v.) where they approach the international border, estab. in 1895, when its area was 54 sq. m. Its boundaries were enlarged in 1932, when Waterton Lakes and Glacier National Parks were proclaimed the Waterton-Glacier International Peace Park. The present area of the park is 204 sq. m. Upper Waterton Lake, from which the park takes its name, is 7 m. long and nearly 1 m. wide and occupies a deep trench between 2 high mt ranges. The international border crosses the lake. Lake and park were named in honour of Charles Waterton, the naturalist. The first settler within the park was 'Koot-enal' Brown, who became the first superintendent of the park.

Watertown: 1. Tn of Middlesex co., Massachusetts, U.S.A., on Charles R., residential suburb of Boston, 7 m. W. There is a national arsenal; manufs. include rubber, paper, woollen goods, stoves, tools, and electrical equipment. W. was founded and incorporated in 1630. Pop. 37,329.

2. Cap. of Jefferson co., New York, U.S.A., on Black R., 47 m. from Oswego. It has a state armoury, and manufs. of paper, wood pulp, air brakes, vehicles,

clothing, silk, thermometers, cheese, and other dairy produce. There are talc and lead mines, and W. is the gateway to the Thousand Is. region. Pop. 34,350.

3. Cap. of Codington co., S. Dakota, U.S.A., 90 m. W. by N. of Sioux Falls. It is a railway, distribution, and processing centre for a large farm area; it is also a resort. Cement products, sashes and doors, beverage, meat, poultry, and dairy products. A municipal airport and power plant are here. Pop. 12,700.

Waterville: 1. Famous angling centre in co. Kerry, Rep. of Ireland, 36 m. W. of Kenmare. Ballinskelligs (8 m. farther W.), a Gaelic-speaking fishing vil., has ruins of an anct castle of the McCarthys and an abbey. Pop. 223.

2. Tn of Kennebec co., Maine, U.S.A., on the Kennebec 17 m. N. of Augusta. Fine water-power is supplied by the Ticonic Falls, and W. is the seat of Colby College. W. is a rail, agric., and trade centre, with paper, textile, and lumber mills. Pop. 18,287.

Watford, municipal bor. of Herts, England, on the Colne, 15 m. NW. of London. A wide variety of light industries includes printing, paper-making, engineering, brewing, and watercress growing. It is a large residential dist. The par. church (13th cent.) includes the Essex Chapel. The almshouses (1580), Monmouth House (17th cent.), Free School (1704), and Frogmore House (1715) are interesting. Aldenham, 2 m. distant has an important public school (1597). Pop. 74,000.

Wath-upon-Dearne, tn and urb. dist. of the W. Riding of Yorks, England, 7 m. from Barnsley on the Dearne and Dove Canal. It lies on the S. Yorks coalfield. Coal and iron mining, and brewing, are carried on. Pop. 13,928.

Watkins, Henry George ('Gino') (1907-32), Arctic explorer, educ. at Lancing and Trinity College, Cambridge. He was interested in natural science and was an expert Alpinist. At 21 he was chosen to organise a univ. expedition to Edge Is., Svalbard (Spitsbergen). In 1928 he undertook the more ambitious task of exploring and surveying the interior of Labrador. The success of this undertaking led to the formation under W. of the Brit. Arctic Air Route Expedition of 1930-1. Later W. planned an expedition across the Antarctic, but gave up for lack of funds and returned in July (1932) to Greenland, where he was drowned while seal-hunting. W. was probably the youngest man ever to receive the Founder's medal of the Royal Geographical Society (1932). See G. S. Chapman, *Northern Lights*, 1932, and *Watkins' Last Expedition*, 1934; J. M. Scott, *Gino Watkins*, 1935.

Watkinson, Harold Arthur (1910-), politician, educ. at Queen's College, Taunton, and King's College, London. He entered Parliament as a Conservative in 1950; from 1952 to 1955 was parl. secretary to the minister of labour, and since that date has been minister of transport.

Watling Street (*Waeclinga Street*), one of the early Rom. highways in Britain.

It ran from Dover, through Canterbury to London, and then N. past St Albans (Verulamium) and the boundary between Leicestershire and Warwickshire to Wroxeter on the Severn, and perhaps to Chester. Branch-roads were added later, and the Kentish branches from the ports of Reculver, Richborough, Dover, and Lympne, focused on Canterbury, became the highway from the Channel ports to London. The road in London, crossed by Bread Street, with Watling Tavern at the corner of Bow Lane, still bears this name. See J. H. Harris, *Watling Street*, 1928.

Watson, J. Broadus, see BEHAVIOURISM.

Watson, John (1850–1907), minister and novelist, known as 'Ian Maclaren,' b. Manningtree, Essex. Educ. at Stirling High School and Edinburgh Univ., he studied for the ministry and became pastor at Logiealmond, in Perthshire, the 'Drumtochty' of his stories. In 1877 he was called to a Glasgow church, and in 1880 to Liverpool, where he remained for 25 years and won great popularity. He was very successful as a writer, and his descriptions of Scottish life became very popular. He wrote sev. novels, the best-known being *Beside the Bonnie Brier Bush*, 1894, *The Days of Auld Lang Syne*, 1895, *Kate Carnegie*, 1897, and *The Young Barbarians*, 1901. See life by W. Robertson Nicoll, 1908.

Watson, John Christian (1867–1941), Australian statesman, b. Valparaiso, Chile, and educ. at Oamaru, New Zealand. He went to New S. Wales, where he became head of the newspaper compositors' trade union. In 1894 he entered the Legislative Assembly and soon afterwards was elected leader of the Parliamentary Labour Party. In 1901 he became leader of the Federal Labour Party. In 1904 W. was invited to form a Gov., the first Gov. formed by and in the interests of Labour in the Commonwealth Parliament, and one of the first that had ever attained to office under Brit. parl. institutions.

Watson, Robert William Seton, see SETON-WATSON.

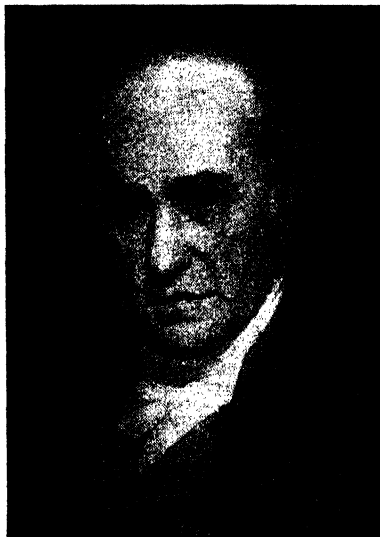
Watson, Sir William (1858–1935), poet, b. Burley-in-Wharfedale, Yorks. His first vol. of verse, *The Prince's Quest*, appeared in 1880, and 10 years later he won fame with *Wordsworth's Grave and Other Poems*. In 1892 he wrote *Lachrimae Musarum*, the official elegy to Tennyson, which he followed with *Odes and Other Poems*, 1894, *The Father of the Forest*, 1895, and *The Purple East*, 1896, in which he coined the name 'Abdul the Damned.' He was an obvious choice for the Laureateship, but lost favour owing to his anti-imperialist views, and it went to Alfred Austin (q.v.). Among his last works was *The Muse in Exile*, 1913. A follower of the Tennyson tradition, he excelled as an epigrammatist. He was knighted in 1917.

Watson-Watt, Sir Robert Alexander (1892–), scientist and inventor, b. Brechin, Angus; educ. at the High School there, Univ. College, Dundee, and

St Andrews Univ. After working in the Meteorological office and the Dept of Scientific and Industrial Research, he was from 1933 to 1936 superintendent of the radio dept of the National Physical Laboratory. Here, following the investigations of the Americans Breit and Ture, he estab. the science of radar (q.v.) as a military weapon. From 1938 to 1940 he was director of communications development at the Air Ministry. In 1940 he became scientific adviser on telecommunications at the Air Ministry, and in 1942 vice-controller of communications at the Ministry of Aircraft Production. He was knighted in 1942. He pub. *Through the Weather House*, 1935, and *The Cathode Ray Oscillograph in Radio Research*.

Watson-Wentworth, Charles, see ROCKINGHAM, SECOND MARQUESS OF.

Watt, James (1736–1819), Scottish engineer, b. Greenock. He became mathematical instrument maker to Glasgow Univ. in 1757. He was employed on



JAMES WATT

Engraving after a picture by Sir W. Beechey.

surveys for the Forth and Clyde Canal (1767), as well as for the Caledonian and other canals, and he was also concerned with the deepening of rivers, including the Forth and Clyde, and with the improvement of the harbours of Ayr, Port Glasgow, and Greenock. He had already begun to think about steam as a motive force, and in 1764, while repairing a model of John Newcome's pumping engine, discovered the cause of its waste of power. He, therefore, in 1765 devised the separate

condenser to obviate the defect, and in 1769 patented his 'Watt' steam engine, which was manufactured at the Soho Ironworks, W. having entered into partnership with Boulton of Soho near Birmingham. His crowning achievement was the invention of the governor or apparatus for regulating the working speed of an engine under varying conditions of load. Between 1781 and 1785 he obtained patents for the sun-and-planet motion, the expansive principle, the double engine, the parallel motion, and a fuel-saving furnace. He also invented copying-ink and discovered independently the composition of water. *Correspondence* regarding this latter discovery was ed. by J. P. Muirhead, 1846. *See* lives by J. P. Muirhead, 1858; T. H. Marshall, 1925; and S. Smiles, *Lives of Boulton and Watt*, 1865; H. W. Dickinson and R. Jenkins, *James Watt and the Steam Engine*, 1927.

Watt, practical unit of electric power, in d.c. circuits equal to the product of volts \times amperes. In a.c. circuits this is the 'apparent' power, the power in W.s is the 'effective' power, the product of volts \times amps. \times (power factor) (q.v.). $1 \text{ W} = 1 \text{ joule/sec.} = 10^7 \text{ ergs/sec.} 1 \text{ h.p.} = 746 \text{ W.}$ *See* METROLOGY.

Watteau, Jean Antoine (1684-1721), Fr. painter, b. Valenciennes. He went to Paris in 1702, and after enduring much privation he was eventually recognised, being made a member of the Fr. Academy in 1717, and painter to the king in the following year. His great 'Embarkation for Cythera' (Louvre) was his 'diploma piece.' Despite his premature death, W. exercised a profound and lasting influence on Fr. art, and left a great number of pictures behind him. Many of them are now in the Louvre, and others are in the Wallace Collection. He excelled in his imaginative portrayal of scenes from It. comedy, having met their actors in the studio of his master Gillot, elegant party groups, 'fêtes champêtres' such as were given by his patron, Crozat. He was, however, an innovator whose work gave inspiration to many less-gifted contemporaries by its brilliance and charm, though its wistful and poetic imaginative quality was his own. His draughtsmanship was superb, and he had complete mastery of atmosphere and composition. *See* E. Staley, *Watteau and His School*, 1907; K. T. Parker, *The Drawings of A. Watteau*, 1931; D. Sutton, *French Drawings of the Eighteenth Century*, 1949.

Wattourmeter, the meter installed in consumers' circuits for continuous measurement and recording of energy consumed. *See* ELECTRIC METERS.

Wattignies, Fr. vil. in the dept of Nord, 5½ m. SSE. of Maubege. The French under Carnot and Jourdan (qq.v.) defeated an allied force, mainly Austrian, here on 16 Oct. 1793, thus saving the Maubege fortress, which was vital to the defence of Paris. Carnot employed new tactics, later improved by Napoleon. Pop. 150.

Wattle, *see* ACACIA.

Wattmeter, electrical instrument for measuring power. *See* ELECTRIC METERS.

Watts, George Frederick (1817-1904), painter and sculptor, b. London. He studied art in the studio of Wm Behnes, the sculptor, and also at the Royal Academy schools. In 1843, when sev. prizes were offered for cartoons to decorate the Houses of Parliament, W. competed and won £300. He became a Royal Academician in 1867. In 1864 he married Ellen Terry (q.v.). In 1902 he was made a member of the newly instituted Order of Merit. Many of his pictures are in the Tate Gallery and the National Portrait Gallery, and there is a permanent exhibition in his house at Compton in Surrey. Among his best-known paintings are 'Hope' and 'Love and Death,' represented by large symbolical figures. His sculpture 'Physical Energy' and his portraits of eminent Victorians represent him at his best. *See* lives and studies by H. Macmillan, 1903; G. K. Chesterton, 1904, 1914; Mary Watts, 1912; E. R. Dibdin, 1923.

Watts, Isaac (1674-1748), minister and hymn-writer, b. Southampton of Non-conformist parents. W. attended a small Independent school and, later, a Dissenting academy at Stoke Newington. In 1702, after some years of educational work, he took the Independent pastorate at Mark Lane Chapel in London. He became eminent as a preacher, but had to retire in 1712 owing to ill health, and for the last 36 years of his life he resided at Theobald's or at other homes of his friend, Sir Thomas Abney (q.v.). During these years he compiled educational manuals, and pub. theological works. He wrote between 500 and 600 hymns, including 'O God, our help in ages past,' and 'When I survey the wondrous Cross.' His collected works (6 vols.) appeared in 1753. *See* lives by E. P. Hood, 1875, and A. P. Davis, 1948; T. Milner, *Life, Times, and Correspondence of I. Watts*, 1834; B. Manning, *The Hymns of Wesley and Watts*, 1932.

Watts-Dunton, Walter Theodore (1832-1914), critic and novelist, b. St Ives, Hunts. He became a solicitor in London, wrote literary criticism for the *Athenaeum*, and became intimate with the Pre-Raphaelites. From 1879 onwards he was a sort of guardian to Swinburne (q.v.). W.'s works include *The Coming of Love*, 1897, a collection of his poems, and the romantic novel *Aylwin*, 1898, which had great popularity. But he was greatest as a critic, in *The Renaissance of Wonder*, 1903, and *Studies of Shakespeare*, 1910. *See* his *Life and Letters* by T. Hake and A. Compton-Rickett, 1916.

Waugh, Alexander Raban (1898-), novelist, b. London, brother of Evelyn W. (q.v.). Educ. at Sherborne and Sandhurst, he held commissions in the Dorsets in both World Wars. His first novel, *The Loom of Youth*, 1917, was a realistic story of school life. Others are *The Lonely Unicorn*, 1922, *Card Castle*, 1924, *Kept*, 1925, *Nor Many Waters*, 1928, *So Lovers Dream*, 1931, *Wheels within Wheels*, 1933, *The Balliols*, 1934, *Going Their Own Ways*, 1938, *No Truce with*

Time, 1941, *Unclouded Summer*, 1948, *When the Clock Strikes Twice*, 1951, *Guy Renton*, 1953, and *Island in the Sun*, 1956. *The Coloured Countries*, 1930, and *The Sunlit Caribbean*, 1948, are travel books, and *Myself When Young*, 1923, and *Thirteen Such Years*, 1932, are autobiographical.

Waugh, Benjamin, see CHILDREN, NATIONAL SOCIETY FOR PREVENTION OF CRUELTY TO.

Waugh, Edwin (1817-90), poet, b. Rochdale. Being apprenticed to a bookseller and printer, he found opportunities for reading. He learned the literary use that could be made of the Lancs dialect, and in 1859 pub. *Poems and Lancashire Songs*. He also pub. sev. sketches of Lancs life and scenery.

Waugh, Evelyn Arthur St John (1903-), novelist, b. London, brother of Alexander W. (q.v.). Educ. at Lancing and Hertford College, Oxford, he was a schoolmaster for a time. In 1927 he pub. a life of Dante Gabriel Rossetti, and in 1928 the first of his humorously satirical novels, *Decline and Fall*; others of the same type are *Vile Bodies*, 1930, *Black Mischief*, 1932, *A Handful of Dust*, 1934, *Scoop*, 1938, *Put Out More Flags*, 1942, and *The Loved One*, 1948. In 1930 he joined the Rom. Catholic Church, and in 1936 his life of Edmund Campion was awarded the Hawthornden Prize; in 1950 he pub. a novel, *Helena*, about the mother of Constantine the Great. During the Second World War he was an officer in the Commandos. *Men at Arms*, 1952, is a novel dealing with the war, and *Officers and Gentlemen*, 1955, is a sequel to it, while *Love Among the Ruins*, 1953, is a satire on the Welfare State. In 1957 *The Ordeal of Gilbert Pinfold* was pub. W. also wrote a number of travel books, including *Labels*, 1930, *Ninety-Two Days*, 1934, *Waugh in Abyssinia*, 1936, and *The Holy Places*, 1953.

Waukegan, city, co. seat of Lake co., Illinois, U.S.A., on Lake Michigan, 36 m. N. of Chicago. W. manufs. asbestos, roofing, steel and steel products, automobile accessories, and drugs. Dairying and resort areas are near. Pop. 35,900.

Waukesha, city, co. seat of W. co., Wisconsin, U.S.A., on the Fox R. in a dairying area 15 m. W. of Milwaukee. It is a health resort with mineral waters that are shipped. It manufs. iron, steel, and aluminium products, motors, farm implements, and air-conditioning equipment. Carroll College is here. Pop. 21,200.

Wausau, city, co. seat of Marathon co., Wisconsin, U.S.A., on the Wisconsin R. in a dairying area with granite quarries 85 m. NW. of Oshkosh. It has cheese factories, breweries, and manufs. paper, woodwork, chemicals, plastics, and machinery. Pop. 30,400.

Wauwatosa, city in Wisconsin, U.S.A., adjoining Milwaukee at W., with stone quarries. It manufs. iron castings, chemicals, leather and wood, and concrete and metal products. Pop. 33,300.

Wave, movement on water (see SEA WAVES AND SWELL). The term *wave* has

also a wider significance. All material substances have some degree of elasticity, and any molecular disturbance which takes place in the body will be propagated through the body in virtue of this elasticity. Elasticity may appear in 2 different forms, such as the resistance offered to change of bulk and the resistance offered to change of shape. The former is called bulk elasticity or degree of *incompressibility*, and the latter *rigidity*. In gases and most liquids, such as water, the resistance to change of bulk is the only one which exists, and any propagation which takes place through the medium of these fluids is due to this type of elasticity. Such W.s are called *longitudinal*, and consist of periodic variations of density in the medium. See also AETHER; ELECTRICITY; HEAT; LIGHT; RADIOCOMMUNICATION; SOUND.

Wave Mechanics. Newtonian or classical mechanics treats bodies as if they possessed well-defined shapes, velocities, and positions. In sev. respects light can be treated as consisting of a stream of corpuscles, but until Einstein explained the photoelectric effect in terms of quanta the most comprehensive theory treated light as an electromagnetic wave (q.v.). The success of the quantum theory (q.v.) showed that light was associated with both wave properties and 'corpuscular' or quantum properties. In 1923 de Broglie suggested that an analogous dualism might exist for material particles, and he showed that a particle of mass *m* travelling with a velocity *v* should be associated with waves of wavelength λ given by $\lambda = h/mv$, where *h* is Planck's constant. This was confirmed by the experiments of Davisson and Germer in 1927 on the reflection and scattering of a beam of electrons by a nickel crystal. G. P. Thomson in 1928 confirmed this work for higher-energy electrons diffracted by a very thin gold foil. Since that time abundant evidence has accumulated to show that particles such as the proton, neutron, and alpha-particle have a wave nature. The theoretical implications of these discoveries, together with quantum theory, have completely revolutionised the physicist's approach to the properties of matter, especially at the microcosmic level. The theory of the electrons around the nucleus when formulated in wave mechanical terms gives a much more complete account of optical spectra than did the 'particle' theory of Bohr (q.v.). Schrödinger (q.v.) made important contributions to this theory from 1926 onwards. The philosophical implications of the wave-particle duality have not yet been fully worked out. See QUANTUM THEORY; ELECTRON; DIFFRACTION; MECHANICS. See also N. F. Mott and I. N. Sneddon, *Wave Mechanics and its Applications*, 1950; N. F. Mott, *Elements of Wave Mechanics*, 1952; L. I. Schiff, *Elementary Wave Mechanics*, 1955; W. Heitler, *Elementary Wave Mechanics*, 1957.

Waveguide, any system of conductors limiting the path of propagation of electromagnetic waves. A co-axial cable or 2

parallel wires are examples. The waves do not penetrate into conductors. The energy in a transmission line does not travel in but *along* the conductors. In h.f. technique, W.s are used as resonant circuits at wavelengths of the order of cm., either in the shape of parallel wires or hollow conductors. Radio waves travel in the W. consisting of the earth and the ionosphere.

Wavell of Cyrenaica, **Archibald Percival Wavell**, first Earl (1883-1950), soldier and administrator, b. Colchester. W. was educ. at Winchester. After passing out of Sandhurst he served in the S. African War as an officer in the Black Watch and then on the Indian NW. frontier. In the First World War he was sent in 1916 to Russia as military attaché to the army of the Caucasus. When Russian resistance collapsed he was transferred to Allenby's staff in the Middle E. In 1937 he was appointed commander of the Brit. troops in Palestine during the Arab-Jewish troubles and handled the situation skillfully. After the Munich Pact he was given the S. Command in Britain, and in June 1939 was sent to Cairo as commander-in-chief of the Brit. forces in the Middle E.

After the collapse of France in 1940 he was called on to defend the entire Middle E. with a few divs. of Brit. troops and a handful of planes. As commander of outnumbered armies during the 3 years of Britain's delaying fight, W. sustained defeat after defeat, but the net gain of his delaying battles, which disrupted the whole Ger. time-table, was incalculable. He won a brilliant victory over Graziani against tremendous odds in Libya (Dec. 1940-Feb. 1941) but was then forced to send 60,000 of his troops together with sev. R.A.F. squadrons, besides numerous tanks and guns, to the defence of Greece, a campaign dictated largely by political considerations. Simultaneously, however, he maintained a deceptive and constant harrying attack in force upon the Sudan, while preparing his offensive against It. E. Africa, a campaign thoroughly planned and brilliantly executed against odds of about 25,000 to 250,000. (*See AFRICA, NORTH, SECOND WORLD WAR, CAMPAIGN IN; ITALIAN EAST AFRICA, CAMPAIGN IN.*) At this time a revolt in Iraq and Ger. intrigues in Persia and, in collusion with the Vichy French, in Syria, called for prompt military action. W. appears not to have expected Rommel's counter-offensive to be launched as soon as it was, and the Brit. intelligence service was deceived on the strength of the Ger. forces then in Libya.

After the Gk débâcle and the loss of Cyrenaica, W. was sent to India, but soon after he was promoted to supreme command in the Far E. against Japan, and after the fall of all the Brit. and Dutch colonial possessions in the S. Pacific he returned to India to organise the stand against the Japanese there and in Burma. He was in Singapore until the Jap. troops entered the is.

He became F.-M. on 1 Jan. 1943. In the same year he was appointed viceroy

in succession to Lord Linlithgow and at once took effective measures to check famine conditions in Bengal. He was replaced as viceroy by Lord Mountbatten in 1948. (*See further under INDIA.*) His pubs. include *Allenby: a Study in Greatness*, 1940, *Generals and Generalship*, 1943, *Allenby in Egypt*, 1943, *Other Men's Flowers*, 1944, an anthology of poetry, *Speaking Generally*, 1946, and *The Good Soldier*, 1948. A critical discussion of W.'s actions in the Second World War is contained in Winston S. Churchill's *The Second World War* (vol. iii), 1950. *See also* W.'s various *Dispatches*; lives by R. H. Kiernan, 1945, and R. J. Collins, 1948.

Wavellite, hydrated aluminium phosphate, occasionally containing iron oxide and fluorine.

Waveney, riv. of England, rises near the Little Ouse and forms part of the boundary between Norfolk and Suffolk. It flows past Diss, Bungay, and Beccles, and has a course of nearly 50 m., being navigable as far as Gledeston. The W. joins the Yare 4 m. SW. of Great Yarmouth.

Waverley, **John Anderson**, first Viscount, of Westdean (1882-1958), administrator and statesman, educ. at George Watson's College, Edinburgh, and Edinburgh and Leipzig Univs. In 1905 he entered the Colonial Office. Subsequently he held various civil service posts, becoming chairman of the Board of Inland Revenue, 1919-22, and permanent under-secretary of state, Home Office, 1922-32. From 1932 to 1937 he was governor of Bengal. In 1938 W. (then Sir John Anderson) entered Parliament as M.P. (National Gov.) for the Scottish Univs., representing this constituency until 1950. He had been knighted in 1919. He was Lord Privy Seal, 1938-9; Home Secretary, 1939-40; Lord President of the Council, 1940-3; and Chancellor of the Exchequer, 1943-5. In 1946 he became Chairman of the Port of London Authority. He was created a viscount, 1952. One of the outstanding administrators of his century, W. is perhaps popularly best remembered for his connection with the standard air-raid shelter issued during his home secretaryship, known as the 'Anderson.' The O.M. awarded to him in 1957 was presented to him in hospital shortly before his death.

Waverly, metropolitan municipality of Sydney in Cumberland co., New S. Wales, Australia. One of the E. suburbs, it includes the famous Bondi Beach. Pop. 66,570.

Wavre, (Flem. **Waver**), city in the prov. of Brabant, Belgium, 16 m. SE. of Brussels. On 18-19 June 1815 Fr. forces under Grouchy gained a victory over Prussians under Thielmann; it was a barren success, since it merely kept Grouchy from aiding Napoleon at Waterloo. In 1940 the centre of the city was totally destroyed. It has breweries, tanneries, iron-foundries, and paper-mills. Pop. 8800.

Wax, name given to various animal, vegetable, and mineral substances, which resemble beeswax in having a peculiar

lustre. W.s resemble fats in that they are lighter than water, melt on heating, and burn well. They are soluble in turpentine, but are insoluble in water and cold alcohol, and differ from true fats in that they do not yield glycerol when boiled with alkalis. Beeswax, the most commonly known W., is secreted by bees, and is obtained by heating the 'honey-combs' in water, when the W. rises to the surface. In the crude state this W. is of impure yellow colour, has a melting point of 63° C. and a sp. gr. of 0.96. It contains 12-15 per cent cerotic acid and some 80-85 per cent of myricin or myricyl palmitate. For candle-making the W. is bleached in the sun after treatment with acid. The W. is also used for waxing floors, and for making varnishes and lithographic crayons. Chinese W., which is used for candle-making in Japan and China, is produced by an insect (*Coccus cerifera*), and consists chiefly of ceryl cerotate. Japan W. is obtained from the seeds of a species of *Ilhus* (*I. succedanea*). It consists mainly of palmitin, is green when raw, and is bleached in the sun. Myrtle-berry W. is another vegetable W. made from the plant *Myrica cerifera*. Palm W., or Carnauba W., is produced from the leaves of the W. palm of Brazil (*Corypha cerifera*) and the Andes (*Ceroxylon andicola*). The W. is found on the leaves of the palm, and these are cut and dried in the sun. The W. is then obtained as a fine powder, when the leaves are shaken. Spermaceti is a W. obtained from the head of the sperm whale. As an example of a mineral W., ozokerite (q.v.) may be mentioned. The most important mineral W. is paraffin W. It is obtained by distillation of petroleum or oil shales, and is largely used for candle-making, as insulating material, in laundries with starch, for waterproofing textiles, and for making pomades and polishes. Other waxes used in industry are as follows: Candellilla, a hard wax from Mexico; Shellac W.; Montan W. (bituminous origin); Ouricoury (palm leaf); and Esparto (Sp. grass).

Wax Flower (*Iloja carnosa*), or Honey-plant, evergreen climbing plant of the family Asclepiadaceae, with thick leaves and wheel-shaped, waxy-looking flowers in clusters.

Wax Flower, Clustered, see STEPHANOTIS.

Wax Myrtle, see BAYBERRY.

Wax Palm, see WAX.

Waxahachie, co. seat of Ellis co., Texas, U.S.A., 30 m. SW. of Dallas; it has a Methodist College. Pop. 11,200.

Waxwing, a bird of the family Bombycillidae, of which there are 3 species. The Bohemian Waxwing (*Bombycilla garrulus*) has a cinnamon-brown plumage changing in parts to grey or chestnut, and relieved by black, white, and a yellow band to the tail. It is easily distinguished from all other birds by the curious expansion of the shaft of some of its wing-feathers at the tip into an appearance of drops of scarlet sealing-wax. The W. is a rare visitor to Britain from the forests of N. Europe and Asia.

Waxy Degeneration, see AMYLOID DEGENERATION.

Way, Right of, see RIGHT OF WAY.

Way of the Cross, see STATIONS, OR WAY, OF THE CROSS.

Waycross, co. seat of Ware co., Georgia, U.S.A., 95 m. W. of Savannah. It is a rail junction, has railway workshops, and manufs. naval stores and lumber products; alligator skins are cured. Pop. 18,900.

Wayland the Smith, mythical farrier, the Völund or Wieland of Norse legend. His tradition is kept alive in England by Wayland's Smithy, a famous megalithic chambered long-barrow at Ashbury, Berkshire, on the capstone of which the wayfarer might leave a groat and find his horse shod by an invisible smith. During the excavation of the barrow in 1919, 2 iron currency bars dating from the Early Iron Age were recovered from the foot of the capstone. It was known as *Welandes smidhan* in a Compton Beauchamp charter granted in 955 by King Edred. See BARROWS; MEGALITH CULTURE.

Waynflete, William, see WAINFLEET.

Ways and Means and of Supply, Committees of, are appointed by the House of Commons at the commencement of every session, as soon as an address has been agreed to, in answer to the speech from the Throne. The business of supply consists of proceedings on motions 'That Mr Speaker do now leave the chair'; supplementary or additional estimates for the current financial year; any excess vote; votes on account; main estimates, whether for the coming or the current financial year; and the consideration of reports from the committee of public accounts and the select committee on estimates. But such business may not include any vote of credit or votes for supplementary or additional estimates for war expenditure.

Waziristan, tract of land, now forming part of Pakistan, lying on the border between Afghanistan on the NW., Baluchistan on the S., and the NW. Frontier Province on the E. It is about 160 m. long from N. to S., and 60 m. from E. to W. The Western half is mountainous. The land slopes E., and is, when irrigated, fertile in the N. round Bannu, but too dry to be pastoral farther S. See H. de Watteville, *Waziristan*, 1925.

Weald, England, specifically the area between the N. and S. Downs (see Downs), and Butser Hill, Hants. The W. includes most of Kent, all Sussex, the S. part of Surrey, and parts of Hants (qq.v.). It is about 120 m. long, and 30 m. wide. The geological structure of the W. is that of a broad anticline with its axis ESE.-WNW. By reason of denudation processes, the oldest rocks are exposed in the centre, and are surrounded by horse-shoe shaped outcrops of progressively younger rocks. The Wealden Series which attains a thickness of some 2000 ft. consists of clays, sands, sandstone, ironstone, and shelly limestones. It consists of the Weald Clay, and the Hastings Beds with their formations of

Fairlight Clays, Ashdown Sands, Wadhurst Clay, and Tunbridge Wells Sand—all named from local exposures. In the large forest known as *Andredeweald*, iron ore was mined in Rom times; Ashdown Forest is all that now remains of this area. Until their depletions in the early 19th cent., the woodlands provided fuel for an extensive iron industry, and the oak was

crats brought the idea down to earth, teaching that increase in W. is to be measured by *product net*, the surplus of agric. and mineral products over cost of production. For Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations* meant a study of exchange values of every kind. While air and sunlight had enormous value in use,

ESTIMATES OF THE NATIONAL INCOME

Year	Total Income	Income above Tax Exemption Limit	Income below Tax Exemption Limit	Of those below Exemption Limit		Authority
				Intermediate Class	Wage earning Class	
	£m	£m	£m	£m	£m.	
1688	43	—	—	—	—	Davenant and Gregory King
1740	64	—	—	—	—	Decker
1783	200	—	—	—	—	Giffen
1800	230	—	—	—	78	Mulhall
1812	431	—	—	—	—	Colquhoun
1835-40	515	250	265	94	171	Giffen
1851	646	272	374	132	242	Levi
1852	440	220	220	—	—	W. Farr
1864	814	370	444	—	—	Levi
1867	961	423	538	120	418	Levi
1867	814	396	418	94	324	Baxter
1875	1,200	—	—	—	—	Giffen
1881	1,168	577	591	143	448	Levi
1883	1,270	602	668	118	550	Giffen
1883	1,274	613	661	140	521	Levi
1883	1,289	—	—	—	—	Mallet
1888	1,300	660	640	—	—	Malloch
1889	1,285	—	—	—	467	Mulhall
1891	1,600	—	—	—	—	Rowley
1903	1,750	—	—	—	—	Giffen
1904	1,710	830	880	225	655	Money
1907	1,945	880	1,065	325	740	Rowley
1907	1,844	909	935	232	703	Money
1907	1,964	672	1,292	—	—	Malloch
1907	2,038 ⁴	800	1,206	325	881	Whittaker
1908	1,920	—	—	—	730	Fabian Society
1914	2,100	—	—	—	—	Money

¹ Exemption limit £150. ² Exemption limit £100. ³ Exemption limit £160.

⁴ Including £32m income of Charities, Friendly Societies, and Local Authorities (excluded from subdivisions)

Based on a table by Sir Thomas Whittaker and reproduced from the late Lord Stamp's *British Incomes and Property* (1916, 1920) by permission of the author's executors and Staples Press Ltd.

highly esteemed for shipbuilding. See R. Furley, *History of the Weald of Kent*, 1871-4; E. Straker, *Wealden Iron*, 1931; Brit. Regional Geology, Geological Survey, *The Wealden District*, 1948, I D Margary, *Roman Ways in the Weald*, 1948

Wealdstone, par. and former urb. dist. of Middx, England, now part of the Harrow urb. dist. W. is an industrial area, and its manufs include photographic materials, glass, and paint-brushes.

Wealth. The Mercantilists regarded W. as money or 'treasure', measuring the profit of international trade by the amount of treasure, of gold and silver, they could thereby amass. The Physio-

only things with value in exchange were measurable W. and the subject-matter of economics. Jean-Baptiste Say insisted that services are W. equally with material things. It may seem fanciful to reckon a song as W.; but the modern statistician cannot make his national W. figures come right if he ignores the fee of the singer. National W. statistics have made great strides in recent years. Since 1941 an extremely valuable series of Brit. Gov. White Papers and Blue Books has given official estimates of the ann. production of national W. (goods and services).

The term National Income and Expenditure denotes two aspects of one thing. The essential equality of the national

income (everybody's income) and the national expenditure (everybody's spending) is a particularly modern conception which is bound up with the modern economic notion that to achieve full business activity it is essential to see that spending is adequate. Since spending is the mainspring of trade and production, the dynamic approach to national income is *via* national expenditure. What is spent will make income (subject to company reserves built from undistributed profits not increasing). Whether income makes (full) expenditure in due course depends upon saving being matched by investment-spending. The income-spending income circuit takes time: on the average money makes income perhaps twice a year. While payment for a shoeshine is spending and income at one and the same time, payment for a shop article makes income at varying intervals, as costs are met farther and farther back along the production line.

Double counting has to be guarded against in computing national income. If a man earns £3000 a year and employs a gardener at £300, both sums represent service and both properly reckon in the National Income. If the £3000 man is taxed to pay £300 a year to pensioners rendering no current service, then the £300 does not count. Indirect taxes cause an artificial inflation of the National Income, creating a difficulty which can be met statistically by using 'factor costs' (i.e. market prices less indirect taxes, plus subsidies). Ordinary inflation can be countered approximately by the price index; but cannot simply be dubbed artificial, since there is fundamentally no base year. Other difficulties remain. The whole concept of summing national income or national wealth in a single figure is, besides practical difficulties of measurement and time-lag, necessarily artificial to some extent, because 'the best things in life are free,' and only those goods and services which are (usually) paid for are reckonable. If a man marries his housekeeper he reduces the (statistical) national income: the housekeeping services move from the paid to the unpaid category. While the practical difficulties are far from being overcome, the White Papers and Blue Books are a remarkable achievement. They represent a period of evolution and advance in new statistical territory, and improvement in approximation and presentation is continuous; in particular, great progress has been made in reducing the field where an impressive balance is due to a mere residual item. The White Papers owe much to Colin Clark, who produced ann. estimates of the National Income from 1924 onwards. Before that there had been a number of estimates for isolated years—notably 1924 (£3,803m.), by Prof. Bowley, and Sir Josiah (later Lord) Stamp. Estimates for earlier years are shown in the table.

See Sir J. C. Stamp, *Wealth and Taxable Capacity*, 1922; A. L. Bowley and Sir J. C. Stamp, *The National Income*, 1924, 1927; C. Clark, *The National Income*,

1924-31, 1932, and *National Income and Outlay*, 1937; *The Conditions of Economic Progress*, 1940; Carter and Roy, *British Economic Statistics*, 1954; *National Income Statistics: Sources and Methods*, H.M.S.O., 1956; also White Papers and Blue Books (ann.).

Wear, riv. of England, rising in the W. Durham Pennines and flowing E. past Durham and Chester-le-Street to the N. Sea at Sunderland, 65 m. in length. It is navigable for barges from Durham. Weardale, moorland in its upper reaches, which comprise Stanhope and Wolsingham, retains its rural character to Bishop Auckland, whence it becomes industrialised and comprises the S. part of the Durham coalfield.

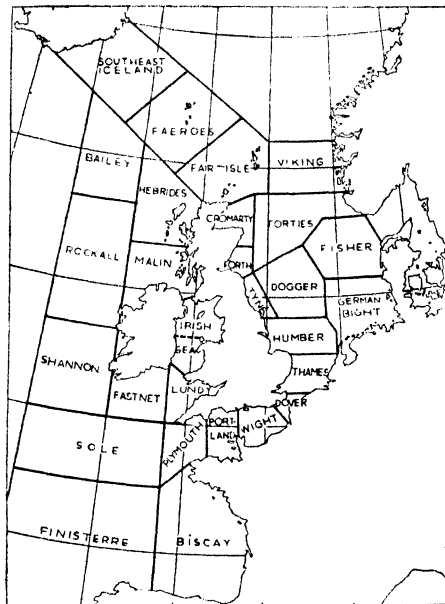
Weasel (*Mustela nivalis*), widely distributed carnivore, native of Europe. Its body is about 8 in. long, and its tail 2-3 in. Its head is small and flattened, with lively black eyes and short, rounded ears. The fur is reddish-brown above and white below. It feeds principally on rodents and small birds. See FUR.

Weather, see METEOROLOGY.

Weather Forecast. The term 'forecast' was invented by Adm. FitzRoy in 1860 when, based on weather maps, the first estimates of future weather were made. W. F.s may be for different periods, but the usual period is 24 hrs, with shorter periods, such as 12 hrs, 8 hrs, or 6 hrs, for special purposes such as aviation. For periods longer than 36 hrs the term 'further outlook' is used by the Meteorological Office to imply that not so much accuracy is to be expected as in the shorter-period forecasts. W. F.s are made by studying the arrangement on the weather maps of those features of weather, such as types of air mass and fronts between them and the wind at various heights, which experience has shown are of importance in forecasting. The forecaster then considers the factors which affect the air masses, such as sunshine by day, its absence at night, the movement of the air masses across different types of country, and the expected changes in the winds. Constant appeal both to physics and the forecaster's knowledge of similar past situations must be made. Mathematical methods, involving the use of large high-speed electronic computing machines, are now being introduced for the forecasting of the pressure distribution. (See further METEOROLOGY.) According to the use made of it, the W. F. is in different forms: (1) as printed in the press or broadcast on radio or television for general public use—this is in very general terms; (2) as broadcast for special users, such as shipping or private aviation—the Shipping Bulletins are broadcast by R/T or W/T from Post Office stations for the separate sea areas shown in the Map, aviation forecasts are broadcast by Air Traffic Control Centres; (3) as individual, local, route, and area forecasts, by request, for flying purposes; (4) as special warnings and forecasts for power authorities (with special attention to temp.), for transport authorities and road engineers (frost, fog, and snow), and for farmers (frost and prospect of dry

spells for haymaking, etc.). W. F.s can be obtained by telegraph or telephone.

See L. W. C. Pack, *Weather Forecasting*, 1949.



MAP OF COASTAL SEA AREAS USED IN FORECASTS FOR SHIPPING AND GALE WARNINGS

Weatherford, co. seat of Parker co., Texas, U.S.A., 34 m. W. of Fort Worth. It has farming, flour milling, foundry, and machine-shop industries. There are natural gas and oil wells. Pop. 8000.

Weathering, the decay and disintegration of rocks under the influence of atmospheric agencies at the surface of the earth. Chemical W. involves the solution or alteration of the rock substance by rain-water. Mechanical W. results from temp. changes, the wedging action of frost, etc., and leads to a simple disintegration of the rock. See DENUDATION; PHYSICAL GEOLOGY.

Weaver, riv. of Cheshire, England, rising in the hills of SW. Cheshire, and flowing for 50 m. into the Mersey near Frodsham. Nantwich and Northwich are towns on its banks. It is embanked for its last 20 m. and linked with the Trent and Mersey canal.

Weaver Birds, or *Ploceidae*, family of passerine birds allied to the finches, so called on account of their remarkable nests, which, in some cases, are immense structures occupied by a colony of birds. They are most numerous in Africa, but extend to Asia and Australia. Most of

them are brightly coloured, particularly in the breeding season. The bodies are somewhat elongated and the tails long, and the prominent conical bill is very powerful.

Weaving, see COTTON; FABRICS, TEXTILE; WOOL.

Webb, Sir Aston, R.A. (1849-1930), architect, b. London; began practice 1873. His huge practice was partly due to his success in important competitions. His chief buildings were the Victoria and Albert Museum, the Royal College of Science, Imperial College, the Victoria Memorial, including the Admiralty Arch and the refronting of Buckingham Palace—all in London; the Univ. and the Law Courts in Birmingham; Christ's Hospital, Horsham; and the Royal Naval College, Dartmouth.

He was President of the Royal Academy 1919-24; President R.I.B.A. 1902-4; and was awarded the R.I.B.A. Royal Gold Medal, 1905.

Webb, Beatrice (Lady Passfield) (1858-1943), social reformer, b. Standish, Gloucester. Before finally deciding to pursue social investigations, she studied conditions among the Lancs cotton operatives and acquired further experience in social institutions by association with Samuel and Henrietta Barnett at Toynbee Hall. It was, however, Charles Booth's *Life and Labour in London* which really determined her to embrace such a career. In 1891 she pub. *The Co-operative Movement in Great Britain*, which is still a standard work.

Soon after this she met Sidney Webb, whom she subsequently married (1891). The first joint pub. of the Webbs was their well-known book *The History of Trade Unionism*. A firm believer in the efficacy of Royal Commissions, she herself served on many, beginning with the Royal Commission on Poor Law and Unemployment, 1905-9. With Sidney Webb (see PASSFIELD), she issued the minority report which initiated the Socialist agitation for the reform of the old Poor Law. She joined the Fabian Society (q.v.) and later became its president. She and her husband carried out researches in the hist. of trade unionism, the Poor Law, and Russia, and their pub. on these subjects are recognised as standard works. Independently she pub. her autobiography in *My Apprenticeship*, 1926; an account of her earlier years, *Our Partnership*, appeared in 1948.

See life by Margaret Cole, 1945; and, ed. by the same author, *The Webbs and their World*, 1949.

Webb, John (1611-72), architect, b. London; became a pupil of Inigo Jones (q.v.) in 1628, and had a substantial but uncertain share in designing a new royal palace at Whitehall c. 1634. He also assisted Jones at Wilton. After his master's death in 1652 he was busily em-

played as an architect on his own account. Among his surviving buildings are Lampport Hall, Northants, c. 1654-7; and the 'King Charles II Block' at Greenwich Palace (later Greenwich Hospital), 1665-8.

Webb, Mary Gladys (1881-1927), novelist, b. Leighton, Salop, daughter of George E. Meredith. In 1912 she married Henry B. L. Webb, a schoolmaster. She wrote a book of poems on nature, *The Spring of Joy*, 1917, and 4 novels, *The Golden Arrow*, 1916, *Gone to Earth*, 1917, *The House in Dormer Forest*, 1920, and *Seven for a Secret*, 1922, before *Precious Bane* was pub. in 1924. This last was awarded the Femina Vie Heureuse Prize and in 1927 became suddenly and immensely popular. Shropshire is the scene of all her novels, which depict a curiously primitive rural life, with unusual imaginative power and pathos. See lives by W. R. Chappell, 1930, H. Addison, 1931, and T. Moulit, 1932.

Webb, Matthew (1848-83), popularly known as 'Captain' W., Eng. swimmer, b. Dawley, Shropshire. He was trained for the mercantile marine on the *Conway*, apprenticed in 1862, becoming mate (1866) and capt. (1875). He successfully swam the Channel (the first to do so) from Dover to Calais without artificial aid in Aug. 1875, covering about 40 m. in 21 hrs 45 min. He was drowned in an attempt to swim the rapids at the foot of the Niagara Falls.

Webb, Sidney James, see PASSFIELD, BARON.

Webbe, William (fl. 1568-91), Brit. critic. Educ. at St John's College, Cambridge, he became a private tutor. He wrote a *Discourse of English Poetrie*, 1586, in which he discusses metre and rhyme (the use of which he reprehends), and reviews Eng. poetry up to his own day.

Weber, Carl Maria von (1786-1926). Ger. composer, b. Eutin, near Lübeck, of an unsettled theatrical family. He picked up musical training under Michael Haydn at Salzburg, Valesi and Kalcher at Munich, and later, in 1810, from Vogler at Darmstadt. By that time he had produced the opera *Peter Schmitt* at Augsburg in 1803, held a conductorship at the Breslau theatre and a court appointment at Stuttgart, whence he was banished for disrespectful behaviour. In 1813 he became conductor at the German theatre in Prague and in 1816 of the Dresden Court Opera. Meanwhile *Silvana* had been produced at Frankfurt on Main, 1810 and *Abu Hassan* at Munich in 1811. *Preciosa*, a play with music, was given in Berlin in 1821 and on 18 June of that year his most famous opera, *Der Freischütz*, appeared there and consolidated the success of Ger. opera as against It. *Euryanthe* was less successful in Vienna in 1823, mainly owing to a poor libretto; but his fame had spread by this time, so that in 1824 the Covent Garden Theatre in London commissioned an Eng. opera from him. This was *Oberon*, for the production of which in 1826 he went to England, where, ill and overworked, he d. For a man of 40 who led the busy life

of a theatre conductor, he left a large amount of all kinds of music, but his fame is upheld by extraordinarily little. Apart from his 3 best operas, 2 of which are generally known only by their fine overtures, little survives but the *Concertstück* for piano and orchestra and *Invitation to the Dance* for piano solo, with perhaps the Concertino for clarinet and the 4 piano Sonatas. But he wrote much incidental music for plays, 3 masses and 2 offertories, 6 cantatas; overtures and other orchestral works; 2 piano concertos and other music for solo instruments and orchestra; a piano Quartet, a clarinet Quintet, and a Trio for flute, cello, and piano; variations and pieces for piano, some with another instrument; piano duets; about 100 songs; vocal duets, trios, and quartets; canons; and about 30 partsongs. See lives by J. Benedict, 1881 (new ed. 1913); E. Kroll, 1934; W. Saunders (*Master Musicians*), 1940; H. J. Moser, 1941; J. Kapp, 1944; W. Zentner, 1962; H. Schnoor, 1953; F. Grüniger, 1945.

Weber, Ernst Heinrich (1795-1878), Ger. physiologist, anatomist, and psychologist, b. Wittenberg. He studied medicine at Wittenberg and at Leipzig, where he was prof. of comparative anatomy (1818), human anatomy (1821), and from 1840 of human anatomy and physiology. In collaboration with his brother Eduard Friedrich W. (1806-71) he discovered the inhibitory power of the vagus nerve on the heart's action (1845). The W.s were also first to measure the velocity of the pulse wave (1825). In 1834 W. propounded *W.'s law* on the relationship between stimulus and sensation: intensity of sensation is not directly proportional to the degree of stimulus, but dependent on its mode of application; a given stimulus is less perceptible when added to a larger stimulus than to a smaller one, i.e. when the sensation increases in arithmetic progression the stimulus must vary by geometric progression. See K. F. W. Ludwig, *Rede zum Gedächtnis an E. H. Weber*, 1878.

Webern, Anton (1883-1945), Austrian composer, b. Vienna, studied musicology at the Univ., but turned to composition, and came under the influence of Schoenberg, whose 12-note system he adopted. He wrote little and was able to perform his works only against great opposition, and they were banned altogether during the Nazi domination of Austria. His compositions include 5 choral works, 6 for orchestra, instrumental and vocal chamber music, Variations for piano, and 20 songs.

Webster, Daniel (1782-1852), Amer. orator, statesman, and jurist, b. Salisbury, New Hampshire; entered Congress for the second time in 1822, was elected to the Senate in 1827, and 9 years later unsuccessfully ran for the presidency. W. became the hero of the N. in 1830 by his speech in reply to Senator Hayne. The slavery question and the threat of secession had already come up. W.'s speech, with its peroration, 'Liberty and Union, now and forever, one and inseparable,' is treasured in Amer. annals.

See lives by G. T. Curtis, 1869; C. M. Fuess, 1930; J. B. McMaster, 1939.

Webster, Jean (1876-1916), Amer. novelist, b. Fredonia, New York state, a niece of Mark Twain. Educ. at Vassar, she wrote *Daddy-Long-Legs*, 1912, a delightful novel which was filmed and dramatised. *Dear Enemy*, 1915, was a sequel, and she also pub. *Patty and Priscilla*, 1903, *Jerry Junior*, 1907, *The Four Pools Mystery*, 1908, *Much Ado About Peter*, 1909, and *Just Patty*, 1911. In 1915 she married Glenn Ford McKinney.

Webster, John (c. 1580-c. 1625), dramatist, b. London, son of a tailor. He was apprenticed to the same craft, and in 1603 was made a freeman of the Merchant Taylors' Company. Between 1602 and 1607 he collaborated with Heywood, Dekker, Middleton, and Chettle. W. wrote tragedies, historical plays, and comedies. The first play written entirely by himself, and printed in 1612, was a tragedy entitled *The White Devil*. His masterpiece was *The Duchess of Malfi*, also a tragedy, first performed by the King's Men at Blackfriars in 1616, and frequently revived.

Superficially, W.'s tragedies seem to be mere melodrama, because the cruelty and terror which pervade his theatrically effective scenes seem to lack adequate motive and credibility. But behind this background of macabre violence the poet in W. sees life itself as pitiless and cruel and this elevates his violence into a philosophy. Of the 3 boisterous comedies. *Westward Ho* and *Northward Ho*, 1607, were written in collaboration with Dekker; *A Cure for a Cuckold* (printed 1661) with Rowley. His *Complete Works* were ed. by F. L. Lucas, 1927. See also lives by E. E. Stoll, 1905, and C. Leech, 1951; F. E. Pierce, *The Collaboration of Webster and Dekker*, 1909; R. Brooke, *John Webster and the Elizabethan Drama*, 1916; C. B. Wheeler, *Elizabethan Tragedy*, 1933; C. Bax, *The Life of the White Devil*, 1940.

Webster, Noah (1758-1843), Amer. lexicographer, b. West Hartford, Connecticut. Educ. at Yale, he was a schoolmaster for a time and became an educational writer. His *Elementary Spelling Book*, 1783, is said to have sold over 70,000,000 copies. In 1828 he pub. his monumental 2-vol. *American Dictionary of the English Language*, which became accepted as a standard Amer. authority, a position still held by subsequent eds. It was due to W.'s ideas of spelling reform that forms like 'center' and 'honor' became standard in the U.S.A. See studies by H. R. Warfel, 1936, and E. C. Shoemaker, 1936.

Webster, Richard Everard, see ALVERSTONE, VISCOUNT.

Webster Groves, city of St Louis co., E. Missouri, U.S.A., W. of St Louis. It manufs. petroleum products. Webster College (part of St Louis Univ.) and Eden Theological Seminary are here. Pop. 23,390.

Wedderburn, Alexander, first Baron Loughborough, and first Earl of Rosslyn (1733-1805), lawyer and statesman, b.

Edinburgh. He was called to the Bar, 1754, but left Scotland and came to London, where he became a member of the Inner Temple, 1757. In 1778 he became attorney-general, and 1780-3 lord chief justice of common pleas.

Wedding Ceremonies, see MARRIAGE.

Wedekind, Frank (1864-1918), Ger. playwright, b. Hanover, son of a physician. He studied law at Munich and Zürich. He was on the staff of *Simplicissimus*, Munich, for a time an actor in Berlin, and produced plays in Leipzig. He ridiculed bourgeois morality, pointing out its hypocrisies; in his plays the primitive forces triumph over civilisation. Works include: *Frühlings Erwachen*, 1891 (Eng. trans. *The Awakening of Spring*, 1909), *Erdegeist*, 1895, and *Die Büchse der Pandora*, 1904 (these last 2 have been made into an opera, *Lulu*, by Alban Berg), *Der Marquis von Keith*, 1904, *Franziska*, 1912, *Lebensschaffen*, 1913, and *Five Tragedies of Sex* (Eng. trans.), 1923. See A. Kutscher, *F. Wedekind* (3 vols.), 1922-31.

Wedgwood, Cicely Veronica (1910-), historian, educ. at Lady Margaret Hall, Oxford. She has written extensively and sympathetically on the Stuarts, and her pubs. include *Strafford*, 1935, *The Thirty Years War*, 1936, *Velvet Studies*, 1946, *Montrose*, 1952, and *The King's Peace*, 1955.

Wedgwood, Josiah (1730-1795), potter, b. Burslem, Staffordshire. 1744-9 apprenticed in his brother's pottery; 1754-9 worked with Thomas Whieldon (see below); 1759 estab. his own factory in Burslem, where he soon made cream-coloured ware (q.v.). In 1762 his new factory, Etruria, began producing Gk-style vases, black 'basalte,' and other stonewares, especially the fine jasper stoneware for reliefs, either on vases or cameos (see PORTLAND VASE; STONEWARE). His published pamphlets and catalogues were trans. into many European languages. In the 19th and 20th cents. his factories produced fine CHINAWARE (q.v.). See lives by E. Meteyard, 1865-6, and A. H. Church, 1894; also W. Burton, *Josiah Wedgwood and his Pottery*, 1922; J. M. Graham and H. C. Wedgwood, *Wedgwood*, 1948. See EARTHENWARE, European.

Wedmore, vil. of Somersetshire, England, noted for the treaty (sometimes called the treaty of Chippenham) concluded here (878) between Alfred and Guthrum by which the country N. of Watling Street was ceded to the Danes (see DANELAW).

Wednesbury, municipal and parl. bor. of Staffordshire, England, 8 m. NW. of Birmingham. In Saxon times it was a fortified stronghold and was later referred to in the Domesday Book. There are manufs. of tubing, boiler plates, axles and springs, bridges and girders, railway rolling stock, and much general engineering is carried on. Lighter industries recently attracted to the tn comprise electrical and motor vehicle components, metal windows, and household accessories. Pop. 34,600.

Wednesday (A.-S. *Wodnesdaeg*, Woden's Day), fourth day of the week. It was the *Dies Mercurii* of the Romans, whom the French follow in calling it *Mercredi* (Mercury's Day).

Weeds, unwanted plants on the farm and in the garden. The prevalence of certain W. indicates the state of soil fertility. Spurrow, sheep's sorrel, sorrel, and bracken indicate acidity; sedges, rushes, mare's tails, cotton-grass, and meadow-sweet suggest waterlogging; but many W. are ubiquitous. The presence of W. provides undesirable and costly competition for cultivated crops and plants.

The problem of weed-control is many-sided, and perennial. W.-seeds may be carried by air currents, water, transport, or foot. Perennial W. with big, underground root systems are very persistent. Great advances in control have been made during the past 25 years. It is most important to control W. early in the growing season. Ann. and biennial W. are largely controlled if they are prevented from producing seeds. Even the most persistent perennial weed can be eradicated if the top growth is persistently destroyed at the juvenile stage for 1 or 2 years. Mechanical methods are effective but laborious. Ann. and biennial W. (groundsel, goosefoot, etc.) readily succumb to hoeing and cultivating throughout spring and early summer. Surface-rooting W. (buttercup, nettles, etc.) may be destroyed in autumn digging by burying 18 in. or more deep. Deep-rooting W. (coltsfoot, bindweed, goutweed, etc.) may be brought under control by removing all roots to a depth of 24 in. and then controlling top growth for the following year by regular hoeing. Control of W. by use of flame-guns, searing with a flame of 2000° F., is efficient, and useful in sterilising seed beds before sowing. Biological control of W. is in its infancy.

The chemical control of W. is undertaken with 2 objectives: the complete elimination of all vegetation from a treated area, or the eradication or control of undesirable W. only, leaving the cultivated plants unharmed. The first objective is achieved by the use of a toxic chemical killing the vegetation and temporarily sterilising the soil, and is applicable to paths, courtyards, hard tennis courts, railways, etc., or to areas intended for reclamation. Sodium chlorate, being non-poisonous, is the most popular chemical for blanket weed-control. At rates of 50-500 lb. per acre, sodium chlorate eliminates all W. and renders the soil sterile for 4-6 months, after which it may be cultivated. Other chemicals for complete weed eradication are salt, arsenic compounds, boron compounds, oils, etc. Chemical control of W. among growing crops or plants depends on the selective action of the chemicals. Dilute solutions of sulphuric acid, copper sulphate, copper chloride, dinitro-ortho-cresol (D.N.O.C.) or certain 'growth-promoting' substances (M.C.P.A. and D.C.P.A.) may be used to kill W. in cereal and onion crops. The chemical solution runs off the narrow-leaved crop plants

but adheres to broad-leaved W. and kills them. Heavy applications of certain fertilisers (sulphate of ammonia, calcium cyanamide, kainite, nitrate of soda), have a similar selective action, chiefly on cereal and grass crops, but should not be used without reference to the state of soil fertility and condition. In the garden selective chemical weed-control is chiefly applied to lawns. Sulphate of ammonia applied alone at 1-1 oz. per sq. yd., or in conjunction with sulphate of iron in the formula for lawn sand (3 parts by weight sulphate of ammonia, 1 part sulphate of iron, 20 parts sharp sand or friable compost) at 4-6 oz. per sq. yd. in spring destroys plantains, daisies, clovers, and other broad-leaved W., and by subsequent fertilising action encourages the grasses. New selective lawn weed-killers are based on growth-promoting substances of plant hormones: 2-methyl-4-chlorophenoxyacetic acid (M.C.P.A.); 2 : 4-dichloro-phenoxyacetic acid (D.C.P.A.). These substances act directly, quickening and distorting growth so much as to encompass the death of affected plants. Broadly, dicotyledon plants are susceptible; monocotyledons are not. Consequently, applications of these weed-killers leave grasses unaffected but many weeds, such as plantains, dandelions, docks, self-heal, chickweed, buttercup, etc., are killed. A judicious use of lawn sand and a selective weed-killer based on a growth-promoting substance effectively controls most lawn W. W. in garden beds and borders among cherished plants can be chemically controlled provided the chemical is applied to the weed foliage only, either by painting or controlled spraying. Stubborn W., such as bindweed, goutweed, and coltsfoot, can be controlled by this means. See H. C. Long and W. E. Brenchley, *Suppression of Weeds*, 1949; S. B. Whitehead, *Garden Weeds and their Control*, 1949; W. W. Robbins, A. S. Crafts, and R. N. Raynor, *Weed Control*, 1951.

Weehawken, township of Hudson co., New Jersey, U.S.A., on the Hudson R., 2 m. NNE. of Hoboken at W. terminus of Lincoln Tunnel. It manufs. caskets, clothing, restaurant equipment, and decalcomanias; there is also textile bleaching, dyeing, etc. It was the site of the duel (1804) between Aaron Burr and Alexander Hamilton. Pop. 14,830.

Week (O.E. *rice*), period of 7 successive days, as in Jewish and Christian calendars, especially such a period beginning with Sunday and including in addition to that day Monday, Tuesday, Wednesday, Thursday, Friday, and Saturday. The W. has been in use in E. countries from the earliest times, but was not introduced into the Rom. calendar till after the reign of Theodosius (4th cent. AD). The names of the days of the W. are derived from the planets, the hrs being allotted to the 7 planets in the order of their supposed distances from the earth, and each planet being regarded as presiding over the day whose first hr belonged to it. Thus the days of the Rom. W. were assigned in order to the Sun, the Moon, Mars, Mercury, Jupiter, Venus,

and Saturn. The Lat. nations have retained the names derived from these deities, but in the Germanic languages they are replaced by names derived from those of the corresponding Germanic deities, Tyr being regarded as the equivalent of Mars, Woden of Mercury, Thor of Jupiter, and Freya of Venus.

Weekley, Ernest (1865-1954), lexicographer, b. London. Educ. at the univs. of Cambridge, London, Paris, and Berne, he was from 1898 to 1938 Prof. of French at Univ. College, Nottingham. He popularised etymology through his books, which include, besides his *Etymological Dictionary of Modern English*, 1921, *The Romance of Words*, 1912, *The Romance of Names*, 1914, *Words Ancient and Modern* (two series), 1926-7, and *Jack and Jill, a Study in our Christian Names*, 1939.

Weeks, Ronald Morse, 1st Baron (1890-), Brit. soldier, educ. at Charterhouse and Calus College, Cambridge. In the First World War he served with the Prince of Wales Volunteers and the Tifle Brigade. In the Second World War he was Director General of Army Equipment and later Deputy C.I.G.S. (1942-5). After the War he was a member of the Allied Control Council in Germany. Following his retirement from the Army he became Dep. Chairman of Vickers, and then Chairman. He was raised to the peerage in 1956. Lord W. is the author of *Organisation and Equipment for War*, 1950.

Weelkes, Thomas (c. 1575-1623), organist and composer, of whom nothing is known before the pub. of his first book of madrigals in 1597. He took the B.Mus. at Oxford in 1602 and became organist at Chichester Cathedral. He d. during a visit to London. He contributed both to *The Triumphes of Oriana*, 1601-3, and to *Leighton's Teares or Lamentacions*, 1614. Numerous services and anthems by him are preserved, but his fame rests mainly on his madrigals and similar vocal works, which show him as one of the greatest Eng. masters in that line.

Weems, an old-fashioned word formerly used in Scotland to describe any underground pit, cellar, or cavern. Often they were souterrains of prehistoric peoples. See SOUTERRAINS.

Weenen, vil. and dist. of Natal, S. Africa, 35 m. SE. of Ladysmith. W. means 'weeping,' and was so-called after the massacre by Dingaan of many Europeans between Natal and W. following the murder of Retief in Feb. 1838. See DINGAAN.

Weeping Myall, see BOREE.

Weatslade, former urb. dist. of Northumberland, England, now part of Longbenton (q.v.).

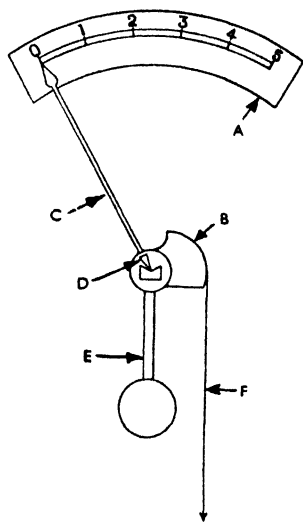
Weevils, Plant-eating Beetles, or *Curculionidae*, family of beetles of the group Rhynchophora of the order Coleoptera. They are characterised by the possession of a distinct beak or snout which is sometimes very long. The larvae are white, fleshy grubs with wrinkled skin and bent bodies, and usually have no legs. These and the beetles of many species cause great damage to cultivated plants, while many cause much loss by their destruc-

tion of grain. The brown pine weevil (*Hyllobius abietis*) is a serious pest of forest trees, often destroying ac. of young conifers, most of the damage being done by the adults. Garden W. feed at night and seek shelter during the day, and can be caught by laying sacks on the ground. See also ANOBIUM.

Weichsel, see VISTULA.

Weigall, Arthur Edward Pearse Brome (1880-1934), Egyptologist and author, educ. at Wellington College and New College, Oxford. W. was inspector-general of Antiquities to the Egyptian Gov., from 1905 to 1914. His works include: *Report on the Antiquities of Lower Nubia*, 1907, *Guide to the Antiquities of Upper Egypt*, 1910, *Life of Akhnaton*, 1910, *Life of Cleopatra*, 1914, *Tutankhamen and Other Essays*, 1923, *A History of the Pharaohs*, vol. i, 1925, vol. ii, 1926, *Nero*, 1930, some books on Brit. archaeology, and some novels.

Weighing Machines. The earliest form of scale was the equal-armed balance (q.v.) which is a beam, or lever, resting on a fulcrum placed exactly half-way



Avery

DIAGRAM OF A COUNTER SCALE

A, chart; B, cam; C, indicator; D, knife-edge; E, pendulum; F, connecting band.

between the end pivots from which the scale pans are suspended. The weights placed in one pan are exactly equal to the weight of the object in the other pan when the beam of the scale is in equilibrium. Counter scales have the pans above the beams or levers, an advantage made possible by the inventions of

Roberval and Béranger. The modern self-indicating counter scale with a chart showing correct weight and price computations is controlled by a pendulum or spring-resistant unit. The figure shows a typical Avery counter scale indicator mechanism consisting of a weighing pendulum pivoted upon a knife-edge; the load from the scale pan is transmitted through the levers and the connecting band to the cam fixed to the body of the pendulum. As the pendulum swings to a position of equilibrium the indicator pointer registers the weight on the chart. A dashpot is used to damp out vibrations of the pendulum.

In scales for weighing heavier loads the weights or poises are only a small proportion of the weight of the goods being weighed. Such machines consist essentially of a lever, or a system of levers, in which the fulcrum is much nearer to the load than to the balancing weights. The classical examples are the Rom. and Dan. steelyards. Platform scales and weighbridges have a compound system of such levers, and modern heavy-capacity scales can be fitted with very accurate indicating and recording mechanisms.

Weight Lifting, athletic practice of raising a weight, usually a metal bar and disks. See OLYMPIC GAMES.

Weights and Measures, see METROLOGY.

Weimar, Ger. city in the dist. of Erfurt, on the Ilm, 13 m. E. of Erfurt (q.v.). In 1547 it became the cap. of Saxe-W., and in 1815 of the grand duchy of Saxe-W.-Eisenach (q.v.). Later it was the cap. of Thuringia (q.v.). After the First World War it became the seat of the new Ger. Rep. It has a grand-ducal palace, as well as other palaces, and a fine 18th-cent. church in which are buried Lucas Cranach and Herder (qq.v.). In the latter part of the 18th cent. W. became one of the great literary centres of Europe owing to the presence of Goethe (q.v.) at its court; and to W. also at the same period came Schiller (q.v.) and Herder. The city is famous also for its musical associations: J. S. Bach was court organist, 1708-17, and Franz Liszt worked in its state theatre, 1849-61 (qq.v.). W. has a radio station and an observatory; it is much frequented by tourists; and it has textile, publishing, and engineering industries. Pop. 65,000.

Weinberger, Jaromír (1896-), Czech composer, b. Prague. His famous opera, *Škandala the Bagpiper*, was produced in Prague in 1927. With its national flavour it recalls Smetana's (q.v.) work, but it is crude by comparison. His 4 later operas did not repeat its success, but the orchestral variations on *The Chestnut Tree* made a momentary hit.

Weinheim, Ger. tn in the Land of Baden-Württemberg (q.v.), 58 m. NNW. of Stuttgart (q.v.). It has a 13th-cent. church, a castle, and a 16th-cent. tn hall. The dist. produces fine wine and fruit. There are leather and other manufs. Pop. 25,000.

Weinsberg, Ger. tn in the Land of Baden-Württemberg (q.v.), 26 m. N. of E. of Stuttgart (q.v.). It has Rom.

remains, a Romanesque church, and a ruined castle, *Weibertreu* (woman's faithfulness), which was the scene of a famous siege in 1140. There is an experimental station for vine and fruit growing. Pop. 6000.

Weir, see RESERVOIRS; RIVER ENGINEERING.

Weismann, August (1834-1914), Ger. biologist, b. Frankfurt-on-Main. He studied medicine at Göttingen and zoology at Gießen, and in 1860 was appointed physician to Archduke Stephen of Austria, a post which gave him leisure to pursue his zoological studies. In 1866 he became prof. of zoology at Freiburg im Breisgau and remained there for the rest of his life. He began important microscopical studies, but abandoned them owing to deteriorating eyesight, turning instead to the study of evolution. His theory of the unbroken continuity of the germ plasma and his evidence that acquired characteristics are not directly transmitted were at first opposed but subsequently accepted. The second, which overthrew the Lamarckian theory of acquired characteristics, is of far-reaching social significance, showing that moral qualities are not transmitted to children but have to be acquired by intensive early training. W. wrote *Studien zur Descendenz-Theorie*, 1876 (Eng. trans., 1882), *Amphimixis*, 1891, *Das Keimplasma*, 1892, *Ueber Germinalselektion*, 1896, *Vorträge über Descendenztheorie*, 1902, *Die Selektionstheorie*, 1909. See life by E. Gaupp, 1917.

Weissbrunn, see VESZPRÉM.

Weissen, Lake, see CARINTHIA.

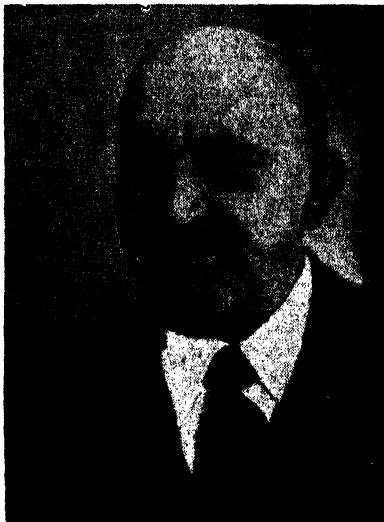
Weissenburg, see WISSEMBOURG.

Weissenfels, Ger. tn in the dist. of Halle, on the Saale, 18 m. S. of Halle (q.v.). It has an anct castle, and has leather, engineering, and lignite-mining industries. Pop. 50,000.

Weisshorn, mt. of the Swiss Alps, canton of Valais, between the Zermatt valley and Zinal; height 14,770 ft. It is noted for its symmetrical beauty. The first ascent was by Tyndall in 1861.

Weizmann, Chaim (1874-1952), Zionist leader and chemist, b. Motol, one of the Jewish 'pales' in Grodno, Russia. Educ. at Pinsk and at the univ. of Berlin and Freiburg, he became lecturer in chem. at Geneva and reader in biochemistry at Manchester Univ. in 1904. In the First World War he was appointed director of the Admiralty laboratories engaged in research work on behalf of the War Office. It was during this period that he made the brilliant discovery of a process for the manufacture of acetone, the basis for high explosives. Between 1917 and 1930 W., as President of the World Zionist organisation, was mainly responsible for the political relationship between the Colonial Office and the Jewish Agency in Palestine (see under ZIONISM). From 1935 to 1946 he was president of the World Zionist organisation and became chairman of the Hebrew univ. at Jerusalem in 1932. Throughout, W. stood for co-operation between the Jewish people and Great Britain in the development and

the upbuilding of Palestine, with the ultimate ideal of a Jewish Commonwealth in Palestine. He became president of the Provisional Council of Israel in 1948, and was sworn in as first president of Israel on 17 Feb. 1949. His autobiography, *Trial and Error*, was pub. in 1949. A scientific institute at Rehovot, Israel, has been named after him.



Israeli Legation

DR CHAIM WEIZMANN

Wejherowo (Ger. Neustadt), tn. of Poland, in Gdańsk prov., 25 m. NW. of Gdańsk (q.v.). It has engineering, furniture, and cement industries. Pop. 15,000.

Welbeck Abbey, seat of the Duke of Portland, and incorporating the remains of a 12th-cent. abbey, stands in a park of 2,283 ac. in Welbeck par., Notts, England, 34 m. SW. of Worksop.

Welch, William Henry (1850-1934), Amer. pathologist, b. Norfolk, Connecticut. He received his medical education at the College of Physicians and Surgeons, New York, and was M.D. 1875. He then studied pathology in Germany. From 1879 to 1884 he was professor of pathology at Bellevue Hospital Medical College, New York, and then moved to a similar chair at Johns Hopkins Univ., where he estab. pathology in America as an important and independent science. He played a leading part in the foundation of Johns Hopkins Medical School and was its first dean. From 1889 to 1916 he was also pathologist to Johns Hopkins Hospital. In 1916 he resigned to become director of the Johns Hopkins School of Hygiene and Public Health, and in 1926

took up his final post as professor of the history of medicine at Johns Hopkins. W., an excellent teacher, did valuable research work in pathology and bacteriology and became one of the leading figures in American medicine. His name is perpetuated in the Welch (gas-gangrene) bacillus, which he discovered in 1892, and in the library at Johns Hopkins Medical School, which is named after him. See D. Fleming, *W. H. Welch and the Rise of Modern Medicine*, 1954.

Welch Fusiliers, The Royal. A number of companies were raised in 1686 in the Welch marches, and in 1689 these were regimented and later numbered 23rd Foot. The regiment served under Wm III in Ireland and at Namur, and distinguished itself under Marlborough at Blenheim, Ramillies, Oudenarde, and Malplaquet. On returning home the W. F. received the title 'Prince of Wales's Own Royal Regiment of Welch Fusiliers.' It fought under George II at Dettingen, and is one of the select few 'Minden' regiments. Further laurels were gained under Wellington in the Peninsula and at Waterloo, and more in the Crimean War, Indian Mutiny, S. Africa, and China. It raised 42 battalions during the First World War, which served in France, Flanders, Italy, Macedonia, Gallipoli, Egypt, Palestine, and Iraq. In the Second World War the 1st and 2nd battalions served in Burma; the 4th, 6th, and 7th fought in the liberation of Europe. See A. D. L. Cary, etc., *Regimental Records of the Royal Welch Fusiliers, 1921-9*.

Welch Regiment, The. Formerly 41st and 69th Regiments. The 41st was raised in 1719 as a regiment of invalids and was composed of out-pensioners of Chelsea Hospital. In 1787 it became a regiment of the line. The Duke of Wellington was in the regiment for a time. It served in the W. Indies and Canada frontier campaign of 1812-14, and later in Afghanistan and Crimea. The 69th was raised in 1756 as a second battalion of the 24th (S. Wales Borderers), but became a separate regiment in 1757. It served in America and Gibraltar as marines, and as infantry at Waterloo. Both regiments were linked in 1881. During the First World War the regiment raised 34 battalions and served in France, Flanders, Macedonia, Gallipoli, Egypt, Palestine, and Mesopotamia. In the Second World War the W. R. fought on the W. front in 1944-5, taking part in all the great battles from the landing in Normandy to the Rhine crossing and beyond.

Weld, Woold, Dyer's Rocket, or Greenweed (*Reseda luteola*), tall plant (family Resedaceae) with racemes of yellow flowers. It occurs on chalky soils and was formerly grown to furnish a yellow dye.

Welding, the process of joining metals together without the use of dissimilar bonding materials. There are 2 main processes: pressure W. and fusion W., and there are sev. types of each.

Pressure Welding. In forge W. the parts to be joined are heated separately

to a temp. at which they can be easily deformed, then superimposed and forged together. In oxyacetylene pressure W. the machined parts may be heated either separately or in contact. At a suitable temp. they are pressed together so that considerable deformation takes place. Resistance W. includes spot W. and seam W. where the electrical resistance of the parts to be joined enables them to be heated electrically. The pressure is applied by the electrodes carrying the current. Some metals, particularly aluminium, can be joined without the application of heat, providing the junction is clean and is sufficiently deformed by the applied pressure.

Fusion Welding (Non Pressure). In gas W. the gas most generally used is oxyacetylene. The parts to be joined are placed in contact and the junction locally heated by the gas flame until fusion takes place. The flame is then slowly moved along the junction while a rod of a filler metal of similar composition is simultaneously melted into the join. A flux is added to remove impurities and prevent excessive oxidation. In arc W. fusion is carried out by an electric arc struck between an electrode and the parts to be joined. D.c. is used for the carbon arc; the metal arc may be either a.c. or d.c., whilst a.c. is used for the atomic hydrogen arc. In carbon arc W. the electrode is carbon; a filler metal and flux may be used if required. In metallic arc W. the filler rod acts as the electrode and is melted into the join. In argon arc W. the electrode is of tungsten and is virtually non-consumable. No flux is used and oxidation is prevented by shrouding the electrode and the arc by the inert gas argon. This method is particularly useful for aluminium and stainless steel. See METALLURGY.

Weldon, Walter (1832-85), Eng. chemist, b. Leicestershire. See CHLORINE.

Welensky, Roy (1907-), Rhodesian politician, b. and educ. in Salisbury, S. Rhodesia. Started life as an engine driver on Rhodesian Railways, then took up professional boxing, becoming heavy-weight champion of the Rhodesias, 1926-8. His trade-union activities revealed a remarkable faculty for negotiation and oratory. He formed the N. Rhodesia Labour party, 1941, and became leader of the unofficial members of N. Rhodesia legislative council. He was primarily responsible for securing for N. Rhodesia favourable terms from the Brit. S. Africa Company in respect of mineral rights and royalties hitherto vested in that Company, thus transforming N. Rhodesia's economy overnight. He took an active part in the formation of the Federation of Rhodesia and Nyasaland (q.v.) with Lord Malvern (Sir Godfrey Huggins). Impatient of Colonial Office attitude towards federation—1949-50—which he publicly termed 'waffling,' R. W. stated his intention of working independently for N. Rhodesian dominion status as an alternative to federation. He became deputy Prime Minister on federation. His dynamism and political philosophy are regarded as a gua-

rantee of intense loyalty to Brit. Commonwealth ideals. C.M.G., 1946; K.B., 1953.

Well, see GUELPHS and GISELLINES.

Welfare, see INDUSTRIAL WELFARE and SOCIAL SERVICE.

Welfare State, name applied loosely to a social system in which the State supplies comprehensive free or subsidised services to those in need. In England the W. S. can be said to have been started by the Liberal reforms of 1906-14. It was extended between the two world wars, and was greatly enlarged following the 1942 recommendations of Lord Beveridge, who proposed that minimum standards in health services, pensions, etc., be established as rights. After the Second World War social insurance covering a wide range of services was applied to everyone irrespective of income. But in the late 1950's, only a few years after the W. S. in its latest form was established, criticisms began on the ground that it undermined personal initiative, was endangering the currency, and undesirably enlarging the sphere of the State in private lives. The notion that the State could create rights based on social insurance that included heavy State subsidies was also questioned. The heavy public expenditure required to distribute social benefits irrespective of need was held largely responsible for post-war inflation, and it was asked whether social benefits should not be confined to cases where need could be established.

Welhaven, Johann Sebastian Cammermeyer (1807-73), Norwegian poet and critic, b. Bergen. In 1838 he settled in Christiania and lectured on Scandinavian literature. As a poet he ranks with the great originators. He attacked the style of Wergeland (q.v.) and gave the impetus to literary forms which have shaped modern Norwegian letters and contributed to the rise of Ibsen, Hamsun, etc. From 1846 to 1868 he was prof. of philosophy at Christiania. His works include *Digte Kunst og Polemik*, 1832, *Norges Daemring*, 1834, *Digte*, 1839, *Nyere Digte*, 1845, *Reisebilleder og Digte*, 1851, *Om Ludvig Holberg*, 1854, *Skildringer*, 1860, *Samlede Skrifter* (collected works), 1867-8. See Eng. trans. of some of his poems in J. Dahl, *Norwegian and Swedish Poems*, 1872. See lives by G. Gran, 1922, and J. Handagard, 1928; and Sir E. Gosse, *Studies in the Literature of Northern Europe*, 1879.

Well, see ARTESIAN WELLS; WATER SUPPLY; WELLS, SACRED.

Well and Trial Boring, the operation by which a hole is made vertically downwards, through earth, rock, etc. In most instances the object of boring is to procure knowledge of the kind, disposition, and depth of the rocks below the surface. The aim may be purely scientific, as at Leipzig, where a hole 6265 ft in depth was bored for the purpose of ascertaining the depth and succession of the underlying strata, thus amplifying knowledge secured from examination of faults, outcrops, etc. More often boring has for its object the acquirement of knowledge of economic value, as in prospecting for minerals. In an area where the existence of beds of

minerals is suspected, holes are bored at various points. An indication of the disposition of mineral beds is thus given, and if the number of borings is sufficient, a fairly reliable map can be drawn. Even after the existence of minerals in paying quantity is proved, it is necessary to ascertain the nature of the overlying strata, so that the difficulties of sinking shafts can be estimated. It may be said that boring is always a necessary preliminary to mining operations, as it is for civil engineering work, involving extensive excavation or requiring foundations of particular stability. The bore-hole often becomes a permanent well in cases where water or oil rises from the lower strata by its own pressure. (See ARTESIAN WELLS; PETROLEUM.) Certain salt-beds are most economically worked by introducing water through the bore-hole for the purpose of dissolving the salt, and then pumping the brine to the surface. The apparatus required for boring depends upon the nature of the rock and the depth to which the hole extends. For shallow boring through soft soil up to about 100 ft in depth augers on the principle of the carpenter's auger are employed. The tool is mounted on jointed rods; the earth is enclosed by the spiral, brought to the surface, and removed. This common wood auger may have a diameter of 1½-2½ in. and is usually started by 1-man-power, but after being sunk a short distance 2 or more men may be employed. During the process of boring, samples are brought up and recorded together with their distances below the surface. Tools are also used which on turning enclose the earth in a metal pod or cylinder. In working on hard rock, drive-pipes are used. These consist of jointed tubes, the lowermost carrying a sharp steel circular cutting edge, and the uppermost for the time being having a screwed-on surface for hammering. For deeper boring a drill is used. This is mounted on jointed rods and operates by percussion and rotation, the rods being slightly turned at each blow. When the weight of the rods becomes considerable a wooden spring-beam is often used. This consists of a pole about 30 ft long and tapering to about 6 in. at the small end. The butt is fixed by means of a heap of stones, and it has another support about 10 ft from the fixed end. This allows a springing up-and-down movement which is communicated to the rods and minimises the labour of the men. The tool is also fitted with a sliding link, as too great rigidity would involve excessive breakage of the rods. The disadvantage of rods is that much time and labour are required to lift them for the purpose of examining the tool or removing the broken rock. The latter operation is carried out by a 'bailer,' a tube with an inwardly opening valve at the bottom. The tube is dashed up and down a few times and the debris brought to the surface. The work of boring is made less tedious by using ropes instead of rods. The drill is kept dropping by its own weight on the rock, and if

it is necessary to raise the tool, the winding up of the rope is not a lengthy operation. Lost tools and broken rods have to be fished for by special apparatus. The most elaborate and efficient boring apparatus comprises a diamond drill at the end of a series of jointed tubes. The drill consists of a bit of soft steel set with about 8 diamonds of about 2 carats each. The drill is rotated by an engine geared so that the drill is advanced slightly at each revolution. The rocky core may be lifted for examination, and a stream of water forced down the tube which, rising between the rock and the tube, keeps the apparatus clear of debris. See S. H. Cox, *Prospecting for Minerals*, 1903; C. Isler, *Well-boring for Water, Brine, and Oil*, 1921.

Welland: 1. Tn in Welland co., Ontario, Canada. It is on the W. riv. and canal, has important fruit-shipping trade, and manufs. iron castings, tubes, structural iron and steel, twine and rope, cotton, and flour. Pop. 16,290.

2. Riv. of England, rises on the boundary between Northants and Leicestershire and flowing N.E. to the Wash, navigable to Spalding and 70 m. long. At a cost of about £1½ million the riv. has been widened and strengthened above and below Spalding, including the construction of the Coronation Channel designed to discharge highland water more rapidly and to protect the fenland from flood.



National Film Board, Canada

A LOCK ON THE WELLAND SHIP CANAL, ONTARIO

Welland Ship Canal was originally built 1824-9, between Lake Ontario (Port Weller) and Lake Erie (Port Colbourne),

parallel with Niagara R. By the enlarged route (completed 1888) it was 26½ m. long, 14 ft. in depth, 200 ft. wide, and by means of 26 locks rose 326½ ft.

The present W. S. C. was begun in 1913, and opened to ships in 1931, construction still being carried on for the purpose of excavating the canal to a uniform depth of 25 ft. There are 7 lift locks having dimensions of 800 ft. by 80 ft. Some 18,000,000 tons of cargo are carried in the 8-month season.

Welles, (George) Orson (1915-), Amer. actor and theatrical and film producer, b. Kenosha, Wisconsin, and educ. at Woodstock, Illinois. He first appeared on the stage in Dublin, 1931, and has since been notable for many outstanding productions and performances. W. became famous as a film director after his production of *Citizen Kane*, in which he also acted. This film, with its experiments in photography, did much to influence subsequent screen technique. Other films directed by W. include *The Magnificent Ambersons*, *Lady From Shanghai*, *Macbeth*, *Othello*.

Welles, Sumner (1892-), Amer. politician, b. New York, and educ. at Groton and Harvard. He entered the diplomatic service in 1915. From 1937 until 1942 he was under-secretary of state, when he resigned, supposedly over a disagreement with official U.S. policy. W. was an efficient administrator. In 1940 he went as Roosevelt's personal envoy to Rome, Berlin, Paris, and London, and wrote *The Time for Decision*, 1944, concerning this mission.

Wellesley, Arthur, see WELLINGTON, DUKE OF.

Wellesley, Henry Richard Charles, see COWLEY, FIRST EARL.

Wellesley, Richard Colley, first Marquess (1767-1842), statesman, eldest son of Garrett W., 1st Earl of Mornington, and the brother of the 1st Duke of Wellington and Lord Cowley, b. Dangan Castle, Meath and educ. at Eton and Christ Church, Oxford. He went to India in 1797 as governor-general, a position he held for 8 years, during which time he increased Brit. authority and proved an enlightened and efficient administrator. In 1809 he became foreign secretary in Perceval's ministry. He was Lord-Lieutenant of Ireland from 1821 to 1828, and again in 1833-4. His Indian despatches were pub. in 1836. See *Lives* by W. M. Torrens, 1880; W. H. Hutton, 1893; G. B. Mallett, 1905; see also P. E. Roberts, *India under Wellesley*, 1929.

Wellesley College, at Wellesley, Massachusetts, one of the foremost women's colleges in the U.S.A. It was founded in 1870 by H. E. Durant of Boston for the express purpose of giving to young women a higher education. Opened in 1875, it now has over 40 buildings, a working library of 300,000 vols., about 1700 students and 190 teachers, and has endowments of over \$14m.

Wellesley Province, see PROVINCE WELLESLEY.

Wellesz, Egon (1885-), Austrian musicologist and composer, b. Vienna,

where he studied musical science at the Univ. and composition under Schoenberg, whose influence showed in his work for a time, together with that of Mahler and Debussy, but was shaken off by him, especially after he had settled at Oxford in 1939. As a scholar he has particularly distinguished himself as an expert in Byzantine music. His compositions include 6 operas; 4 ballets; choral and orchestral works (2 symphonies); a piano Concerto; 7 string Quartets and other chamber music; and a few piano pieces and songs.

Wellingtonborough, mkt tn and urb. dist. of Northants, England, on the Nene, 10 m. NE. of Northampton. It is a centre for footwear and for agriculture. Iron is mined and foundries are worked. Pop. 28,520.

Wellington, Arthur Wellesley, first Duke of (1769-1852), soldier and statesman, third son of Garrett W., 1st Earl of Mornington, b. Upper Merion Street, Dublin, and educ. at Eton, and later at Pignerol's Military Academy at Angers. He entered as an ensign in the 73rd Regiment in 1787, and then for a few years sat as member for Trim. He commenced his military command at the head of a brigade in Holland in 1794. It was in India as a colonel in the war against Tipoo that he first gave signs of a transcendent military genius. After being left in command of the troops at Mysore, he baffled Napoleon's Oriental plan of a descent on S. India from Egypt as a base, by invading Mysore and destroying or scattering the 40,000 followers of Dhondyaiah Waugh before Fr. forces could be sent there. In 1803 he was appointed chief political and military agent in the Deccan and the S. Mahratta states, and on the fresh outbreak of trouble with the native chiefs, Sindiah and Holkar, he added to his reputation by the signal defeat of an overwhelming force at Assaye. Though he received the thanks of Parliament and was knighted for his services, he does not appear to have been satisfied with either his treatment or his prospects; he resigned his command and appointment in the early part of 1805, and shortly afterwards sailed for England.

In 1806 he was returned as member for Rye, and a year later became chief secretary for Ireland and a privy councillor, but on the threat of a Fr. invasion he was soon in active service again. After a short campaign in Denmark, which ended in the complete humiliation of the Danes, he was sent to Spain. He landed at Corunna in July 1808, but, not being in sole or chief command, was almost immediately involved in difficulties with incompetent rivals like Dalrymple and Burrard, much in the same way that his genius was thwarted in India by persons whose social status was in advance of their military capacity. In 1809 he returned to England and resigned, but was afterwards sent out in sole command, and from that point onward began a series of splendid victories which culminated in the complete evacuation of Portugal and Spain by the French. For long ill-sup-

plied with men and materials, W. defeated a succession of Fr. marshals and proved to Europe that Napoleon's military system was not invincible. Though not of a character to win deep affection, he gained the profound respect of his troops; he displayed the highest strategic and tactical qualities and a fine control of supply and organisation. (See PENINSULAR WAR.)

In 1815, loaded with honours, W. was ambas. to the restored Bourbon court, and Brit. representative at the congress of European Powers at Vienna, when news

Fortescue, 1925; P. Guedalla, 1931; M. Wellesley, 1937; T. Lloke, 1939; J. Chastenot, 1945; R. Aldington, 1946; Sir C. A. Petrie, 1956.

Wellington: 1. Tn of Shropshire, England, 10 m. E. of Shrewsbury, near the foot of the Wrekin at the junction of the industrial and agric. dists. (see SHROPSHIRE). Wrekin College, founded 1880, is in the tn. Pop. 13,000.

2. Tn in Somerset, England, with manufs. of bedding and woollen goods. The Duke of Wellington took his title from this place, and on the summit of the



High Commissioner for New Zealand

WELLINGTON, LOOKING TOWARDS MOUNT VICTORIA

In the middle of the picture, following the water-front, is the business area of the city.

came of Napoleon's escape from Elba. There followed his best-known campaign, that of Waterloo (q.v.). Returning to England, he was granted £200,000 for the purchase of the estate and mansion of Strathfieldsaye in Hants. In 1818 he recommenced his political career, a staunch Tory, becoming Prime Minister in 1828. He carried through the Rom. Catholic emancipation, but resigned in 1830, refusing to agree to electoral reform. He was foreign secretary under Peel (1834-5) and minister without portfolio (1841-6), supporting Peel's repeal of the corn laws. He d. at Walmer Castle, and was buried in St Paul's Cathedral by the side of Nelson. See his *Despatches* ed. by J. Garwood, 1837-45, and *Letters (A Great Man's Friendship)*, ed. by Lady Burgholere, 1927; see also C. O. Head, *Napoleon and Wellington*, 1939; and lives Sir H. Maxwell (6th ed.), 1907; J. W.

Black Downs is a monument to his memory. S. of the tn is Wellington School, a public school for boys, founded 1841. Pop. 7376.

3. Tn of New S. Wales, Australia, in Wellington co., on the Macquarie R., 65 m. NNW. of Bathurst. The dist. is agric., cattle and sheep are reared, and there is mainly wheat-growing. The W. caves contain interesting fossil remains. Pop. 5200.

4. Tn of Cape Prov., S. Africa, about 50 m. NNE. of Cape Town, not far from Bain's Kloof pass. It began as a Huguenot settlement, and the Huguenot College has made W. known all over S. Africa. W. is developing industrially, and there is a textile factory and a wool-washing and processing plant. Fruit and vegetable canning, jam factories, and wineries in W. cater for the dist., which is agriculturally rich. Pop. (Whites) 4000; (Coloureds) 6000.

Wellington: 1. Prov. dist. of N. Is., New Zealand (q.v.), bounded on the W. and S. by the Tasman Sea and Cook Strait, largely mountainous, with a fertile coastal strip. Wellington (see below) is the prin. port and the dominion cap. Area 10,870 sq. m.; pop. c. 349,400.

2. Port and cap. of New Zealand, in the prov. of the same name in the N. Is., bounded by Cook Strait to the S. The city was founded in 1840, as Britannia, by the New Zealand company with Gibbon Wakefield as the presiding spirit and his brother Wm as leader of the expedition. W. lies at the geographical centre of the dominion, and close to its centre of pop. It has an excellent harbour and good means of communication with all parts of the dominion. As the result of its situation, and as the seat of gov., W. has become the H.Q. of the chief commercial institutions and possesses many handsome buildings. The harbour is one of the prin. ports of the dominion for the shipment of wool, frozen meat, dairy produce, apples, and other exports, and a large proportion of the dominion's imports arrive through W. The city is the seat of Victoria Univ. College, and amongst its more important buildings are Parliament Buildings, Government House, the war memorial, art gallery, and museum, and a very modern municipal library. Pop. (urb. area) 138,035. See A. Mulgan, *Centennial Survey*, 1940.

Wellington College, public school for boys at Crowthorne, Berkshire. It was founded by public subscription as a memorial to the Duke of Wellington, for the education of the sons of deceased officers, and was incorporated by royal charter in 1853. There are now about 675 boys, most of whom are fee-paying.

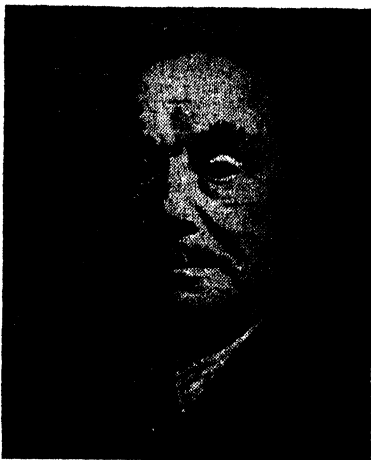
Wellington Museum, see APSLEY HOUSE.

Wellingtonia, see SEQUOIA.

Wells, Herbert George (1866–1946), novelist and sociologist, b. Bromley, Kent, youngest son of Joseph W., ex-gardener, general dealer, and professional cricketer. W. was educ. at Morley's Academy in Bromley, which school he has scathingly described in 'The Academy for Young Gentlemen' in the *Journal of Education* (Oct. 1893). But W. also read much at home and at the local literary institute. For some years he had to combat his mother's resolve to make a draper of him; indeed, he had a month's trial at one firm which, he says, 'rejected him as unsuitable for their high trade'; the 'high trade' is duly lampooned in *The Wheels of Chance*, 1896. In 1881 he was apprenticed to a chemist in Midhurst and this uncongenial interlude finds its literary expression in *Tono-Bungay*, 1909, as Wimbleshurst.

In 1884 he went to London for three years on a science studentship, attending the Normal School of Science at S. Kensington, the life at which is touched on in his *Ann Veronica*, 1909, a novel which was a notable contribution to the cause of women's emancipation. He became later assistant master at Holt, near Wrexham, but was rendered semi-invalid by a football accident. From 1887 he taught at

Kilburn for 2 years. He took the degree of B.Sc. (1st class honours) at London Univ. in 1890. He was tutor for 2 years at the Univ. Correspondence College; there he met Amy Catherine Robbins, who became his wife. He broke a blood-vessel in his lungs (1893), and was forced, but probably not against his will, into authorship.



Karsh, Ottawa

H. G. WELLS

His first real literary success was in 1891 when Frank Harris (q.v.) accepted his 'The Rediscovery of the Unique' for the *Fortnightly Review*, and this was followed by some scientific essays in the *Gentleman's Magazine*. At this period, too, while lecturing and coaching, he wrote some books on biology and physiology. While recuperating at Eastbourne he wrote a sketch, 'On the Art of Staying at the Seaside,' which appeared in the *Pall Mall Gazette*, to which he became a regular contributor. From 1894 he was at work on a story which became *The Island of Dr Moreau* (rejected at its first offer) and then completed *The Wonderful Visit*, 1895. He first won nationwide recognition with his *War of the Worlds*, 1898, which was serialised in the *Windsor Magazine*. His earlier novels are scientific romances. In these he estab. an original type of story evolved from a combination of scientific facts, highly coloured with imagination and frequently told as of the future. The most successful are *The Time Machine*, 1895, *The Invisible Man*, 1897, and *The First Men in the Moon*, 1901. His social-science novels are of a different order. They are novels about middle-class problems and reveal great insight into the complexities of the marriage problem. The best of these are *Love and Mr Lewisham*, 1900, *Kipps*, 1905, *Mr Polly*, 1910, and *Marriage*, 1912. W. was a Fabian; he was

more than a mere social regenerator; he was a prophet of world organisation, whether in such fiction as *Mr Brilling Sees it Through*, 1916, and *The World of William Clissold*, 1926, or in non-fictional works like *God the Invisible King*, 1917, *Outline of History*, 1920, *Short History of the World*, 1922, and *Short History of Mankind*, 1925.

W.'s ruling theme was the need for man to impose his mastery upon his own creations; and, in pursuance of this concept, he became a leading advocate of planning. Yet, though in the capacity of a worker in the cause of human progress he achieved world-wide fame and some measure of assent, his predictions were sometimes hard to reconcile with his own message. W. used literature to express his views on social or other institutions and only secondarily as a craftsman and artist. But he could write with delicacy and rare verbal felicity, as, e.g., in *The Country of the Blind*, 1911, which is generally admitted to be one of the best short stories in the language.

The Outline of History, 1920, was an ambitious attempt to illustrate the continuity of hist. from the beginnings of life to the treaty of Versailles, a fine if characteristically mannered popularisation of novel educational value. It was the first vol. in a trilogy planned to popularise the historical, scientific, and sociological ideology appropriate to the task of creating a World State. The succeeding 2 vols. were *The Science of Life*, 1929, written in collaboration with Dr Julian Huxley and his son, G. P. Wells, and *The Work, Wealth and Happiness of Mankind*, 1932. *Experiment in Autobiography* was pub. in 1934. See lives by G. West (with a full bibliography), 1930; V. Browne, 1951; N. Nicholson, 1951; also F. H. Doughty, *H. G. Wells: Educationist*, 1926; M. M. Meyer, *H. G. Wells and his Family*, 1956.

Wells: 1. City, bishop's see, parl. and municipal bor. in Somerset, England. Its hist. begins in Saxon times, and Ina, King of Wessex, is said to have founded its first church in 704. The cathedral, of the diocese of Bath and Wells, was begun in the late 12th cent., and the central parts of the building—transepts, E. bays of nave and W. bays of choir—are in the Transitional Norman style of that period. Jocelin, bishop from 1206 to 1242, built the rest of the nave, the W. front and the N. porch, all superb examples of Early Eng. architecture. The E. end and the central tower belong to the early 14th cent., and the W. towers to the early 15th. The W. front, with its collection of 350 statues is unrivalled in this country. The cathedral is also famous for its lady chapel and crypt, the choir and chapter house, and its beautiful 14th-cent. stained glass. The bishop's palace, built by Jocelin, is moated and surrounded by a defensive wall. Other subordinate buildings include the 15th-cent. Deanery and the delightful Vicar's Close. W. has manufs. of paper, brushes, textiles, and there are agric. mrkts. Pop. 6000.

2. Or Wells-next-the-Sea, urb. dist. of

Norfolk, England, a fishing port and seaside resort. Pop. 2610.

Wells, Sacred, have been centres of worship and religious magic from the earliest times. During the Middle Ages the intervention of a saint was generally substituted for that of the original water-deity. Famous Brit. wells are those at Tissington, Derbyshire, of St Winifred (Holywell), St Chad (Lichfield), St Anthony (Maybole), St Keyne (Cornwall), St Eilian (Denbigh). Others are the sacred spring of Coventina and her temple at Carrawburgh on the Rom. Wall, and the hot springs of the goddess Sul at Bath.

Wels, Austrian tn in the prov. of Upper Austria, on the Traun. It has many Baroque buildings, a 14th-cent. church, and the castle where Maximilian I (q.v.) d. Machinery and foodstuffs are manuf., and there is an agric. fair. Pop. 38,100.

Welsbach, Carl Auer, Baron von (1858–1929), Austrian chemist, b. Vienna, chiefly remembered as the inventor of the incandescent gas-mantle, which he put on the market in 1885.

Welsh Art, see WALES, *The Arts*.

Welsh Cattle, see CATTLE.

Welsh Corgi, small Welsh cattle-dog; the advantage of its small size is that cattle are unable to get their horns low enough to harm it. There are 2 distinct varieties, the Pembroke and the Cardigan. The former weighs from 18 to 24 lb. and has a maximum height of 12 in. at the shoulder. The head is foxy in outline, the chest broad and deep, the body of medium length, and the legs short and straight. The favourite colour is red, or red and white. The Cardigan variety is somewhat larger and heavier, with a longer body; the head is less foxy; there are sev. colours, including red and black-and-tan, usually with white markings. The breed is very intelligent and makes a reliable guard.

Welsh Fusiliers, see WELSH FUSILIERS.

Welsh Guards, formed on 26 Feb. 1915, on a cadre of Welshmen in the Grenadier Guards. The then Prince of Wales was first colonel of the regiment, and the queen is colonel-in-chief. Their motto is 'Cymru-Am-Byth' ('Wales for Ever'). Two battalions were raised which served during the First World War in France and Flanders, the first battle being Loos. Other outstanding actions in which they participated are Ginchy, Fiers-Courcellette, Morval, Plickem, Poelcappelle, Cambrai, 1917–18. Bapaume, 1918, Canal du Nord, and the Sambre. In the Second World War the W. G. served in NW. Europe and in Italy. Detachments were part of the Guards Armoured Div. in France (1944–5) which crossed the Orne into the Caen plain and subsequently fought in the battles for the Rhine and beyond.

Welsh Harp, harp having 3 rows of strings; the 2 exterior were tuned in unison diatonically, the inner row giving the extra sounds required to complete the chromatic scale.

Welsh Language and Literature, see WALES, *Welsh Language and Literature*.

Welsh Mountain Breed, see **SHEEP**.

Welsh Music, see **WALES, Music**.

Welsh Springer, see **SPANIEL**.

Welsh Terrier, small terrier of about 20 lb. in weight. Its colour is black and tan, or black, grizzle, and tan, and except for this it strongly resembles the wire-haired fox terrier, though its skull is slightly wider between the ears. The breed is eminently suitable as a small house dog and companion.

Welshing, see **LARCENY**.

Welshpool, bor. and co. tn of Montgomeryshire, Wales, 15 m. S. of Oswestry, on the R. Severn and Shropshire Union Canal. It is an important agric. centre for a wide area, and has one of the largest mrkts in Wales. Pop. 6000.

'Welt, Die', German daily newspaper, pub. in Hamburg, with subsidiary presses in Essen and Berlin. Founded in 1846 and independent in outlook, it has a wide circulation in W. Germany and is sold in 81 foreign countries. Circulation over 200,000.

'Weltwoche, Die', Swiss political weekly paper, founded in 1933 by Karl von Schumacher. Its outlook was rigorously anti-Nazi, and the paper was forbidden in Germany under Hitler; later it gained much popularity with the Fr. Resistance movement. After the war the W. denounced Communism, at the same time sponsoring the unification of the independent European countries and N.A.T.O. policy. Politically the W. is not attached to any party, its general attitude being liberal. It carries supplementary pages on cultural and scientific subjects, and its influence extends to most W. European countries and also overseas.

Welwitschia. The one species, *W. bainesii*, is representative of its genus and family, and unique in character. Native to almost rainless parts of SW. Africa, the trunk is obconical, up to 3 ft in diameter, and 3-12 in. high, with 2, rarely 3, ribbon-like, leathery leaves, split into many thongs at the end, growing from the circumference of the trunk, gradually dying from the tips and being continuously replaced from the base. It is grown chiefly in botanic gardens, in special soils of rotten granite and leaf mould.

Welwyn, rural dist. and vil. of Herts, England, 3 m. NW. of W. Garden City (q.v.), from which the garden city takes its name. There is evidence of Rom. occupation. The poet Edward Young (q.v.), author of *Night Thoughts*, was rector here for 35 years and was buried in the church in 1765. Pop. 2800.

Welwyn Garden City, tn of Herts, England, situated 21 m. NNW. of London. It was the second of Howard's garden cities, estab. in 1920 by him, Sir Theodore Chambers, C. B. Purdom, W. T. (later Lord) Layton, and others associated in a joint-stock company formed on a limited dividend basis. The tn was planned for a pop. of 40,000 as a satellite tn to provide for the decentralisation of pop. and industry from London; the original pop. on the entire estate was 400. In May 1948 the minister of town and

country planning made an order under the New Towns Act (1946), establishing a development corporation to take over the tn and to complete it, having reduced the ultimate pop. to 36,500. In 1954 the minister of housing and local gov. decided that the ultimate pop. was to be raised to 50,000, and that the development corporation should develop it to 42,000, the balance being by way of natural expansion. Many experiments of public interest were undertaken in the tn, the most important of which was the **Welwyn Stores**, which is the tn's main shopping centre. W. has over 80 industries, mostly food and light engineering. For a detailed historical and factual account see C. B. Purdom, *The Building of Satellite Towns*, 1925, 1949. Pop. 23,000.

Wembley, municipal bor. of Middlesex, England, situated W. of Willesden, and formerly in the par. of Harrow. It was an area of grass farms until the railway first began to cross it in 1845. In 1924-5 the Brit. Empire Exhibition was held at W. The Empire Stadium, built in 1923 to hold 100,000 people, is used for the Football Association and Rugby League finals. The Empire Pool and Sports Arena is the venue of ice-hockey, boxing, and other sports. Many events of the 1948 Olympic Games were held at the stadium and at the pool and the sports arena. Greyhound and speedway racing also take place. The bor. is chiefly residential, but there are industries, including electrical, chemical, aircraft and motor manufacturing. W. returns 2 members to parliament. Pop. 129,500.

Wemyss, par. in Fife co., Scotland, on the Firth of Forth. The dists. of W. Wemyss, E. Wemyss, Coaltown, and Methilhill are situated within the boundary of the par. and are all engaged in the coal-mining industry. At E. Wemyss is situated Wemyss Castle, once visited by Mary, Queen of Scots. Pop. (par.) 34,000.

Wenceslaus, or **Wenzel**, St (d. c. 929), Duke of Bohemia. In consequence of his efforts to stem the tide of pagan reaction he was assassinated by his brother Boleslav. St W. is the patron of Bohemia and the 'Good King Wenceslas' of the carol. His feast is on 28 Sept.

Wenceslaus IV (1361-1419), King of Bohemia and Holy Rom. Emperor, son of the Emperor Charles IV, whom he succeeded in 1378. W. was an incompetent ruler, and in 1394 the Bohemian nobles rebelled and made him a prisoner. In 1400 four Ger. electors pronounced him deposed from the imperial throne, but he recovered Bohemia in 1404 and retained it until his death.

Wenchow, former treaty port of China, in the prov. of Chekiang. It is a walled tn, and has manufs. of paper, silk, etc. Pop. 215,800.

Wenden (now **Latvian Cesis**), tn in Latvia, 60 m. NE. of Riga. Pop. (1939) 9000. It has the ruins of a castle (built 1210), which was the residence of the Grand Masters of the Teutonic Knights 1237-1577.

Wendover, tn. of Buckinghamshire, England, 5 m. SE. of Aylesbury. The church, containing much 13th-cent. work, possesses a fine 14th-cent. tower. Pop. 5000.

Wends, people belonging to the W. group of the Slavonic peoples. They speak a Slavonic language (see under *INDO EUROPEAN LANGUAGES*), and, being Catholics, they employ an alphabet of Latin origin (not Cyrillic). Though few in number and entirely surrounded by Ger. speakers in the region of Lusatia (q.v.) in E. Germany and SW. Poland, they have maintained to a large extent their identity, their customs, language, and literature. Nowadays, the W. are concentrated principally in the Spree Forest (Spreewald) area of Lusatia, on the R. Spree between Cottbus and Lübben, but in the 6th cent. they were a powerful people, inhabiting the region extending from the Elbe to the Oder, with kindred tribes living beyond the Oder as far as the Vistula. See also *SLAVS*.

Wengen, Swiss holiday resort and winter sports centre, situated on the W. slopes of the Little Scheidegg (q.v.) in the Bernese Oberland. It is linked with Lauterbrunnen and Interlaken by a cog-railway. Altitude 4190 ft.

Wenia, see *VIENNA*.

Wenlock, municipal bor. of Shropshire, England, on the R. Severn, 12 m. SE. of Shrewsbury. The chief buildings are the 18th-cent. Guildhall, which contains some beautiful oak carving, the church of Holy Trinity, and the ruins of Wenlock Abbey. W. is an agric. centre. Coal and iron are also mined, and limestone is quarried. The bor. includes Broseley, Coalbrookdale, Iron Bridge, Madeley, and Much Wenlock. Pop. (of bor.) 15,000.

Wenlock Beds, name given to stratigraphical subdivision of the Silurian system. The Wenlock Shale is followed by the Wenlock Limestone. These beds are well seen in the Welsh borderland. The Dudley Limestone is a very fossiliferous rock of Wenlock age. Wenlock is named after the Shropshire village.

Wenning, Pieter (1873-1921), S. African artist, b. The Hague, Netherlands. Although his ambition to become an artist was opposed by his family, he left Holland for the Union of S. Africa in 1905 and worked in bookshops, eventually becoming a professional artist in 1916 with the assistance of friends. In a short but full career he produced sev. hundreds of paintings and drawings, and is now regarded as one of the founders of contemporary S. African art. See G. Roonsaier and I. Lippy Lipshitz, *Wenning*, Cape Town, 1949.

Wensleydale, in the N. Riding of Yorks, England, that part of the valley of the Ure beginning near Jervaulx Abbey and continuing until near the source of the riv. in Lunds. It is remarkable for its beauty and historical associations. Wensley, at a point where the riv. is crossed by a 15th-cent. bridge, has a fine mid-13th-cent. church. Middleham Castle dates from the 12th cent.; and Bolton Castle, a 14th-cent. fortified mansion built by Richard

le Scrope, was where Mary Queen of Scots was imprisoned in 1568. W. gives its name to a breed of long-woolled sheep, and a make of cheese—now produced in cheese factories. See M. Hartley and J. Ingilby, *The Yorkshire Dales*, 1956.

Wensleydale Peerage, Eng. peerage called after Sir James Parke, Baron Wensleydale, a judge of the court of exchequer, who was created a life-peer in 1856. The House of Lords protested that the privilege of the Crown to create life peerages had fallen into disuse, and if revived the hereditary peers might at the wish of the Crown be outnumbered in the House by life-peers. Wensleydale was accordingly created a peer in tall male. Since then a certain number of Lords of Appeal in Ordinary have been created official life-peers.

Wensleydale Sheep, see *SHEEP*.

Wentworth, Charles Watson, see *ROCKINGHAM, SECOND MARQUESS OF*.

Wentworth, Thomas, see *STRAFFORD, FIRST EARL OF*.

Wentworth, William Charles (1793-1872), Australian statesman and newspaper-owner, b. Norfolk Is. He became the first native Australian champion of civil and political rights and was known as 'the Australian patriot.' He practised law in Sydney, and in 1824 started the *Australian*, the first privately owned newspaper in Australia. In it W. supported the political enfranchisement of 'emancipists' or ex-convicts at the expense of 'exclusivists,' or voluntary immigrants, officials, and others. W. pioneered in the struggle to obtain for New S. Wales the rights and privileges generally accorded to settlement colonies. One of the leading advocates of representative gov. for New S. Wales, his agitation led to the recall of Governor Darling (1833) and, sev. years later, to the passing of the Colonial Act (1840) which gave colonial self-gov. to Australia. W. founded Sydney univ. in 1852. See A. C. V. Melbourne, *William Charles Wentworth*, 1934.

Wenzel, see *WENCESLAUS, ST.*

Weobley, picturesque vil. of Herefordshire, England, 8 m. SW. of Leominster, with many black-and-white timbered medieval houses, a 17th-cent. grammar school (now a private house), and the moat and bailey of the 12th-cent. castle. The church, with ball-flower ornament, is largely 14th cent. Pop. 630.

Werenskiold, Erik (1855-1938), Norwegian painter, was one of a group which included Harriet Backer (1845-1932) and Gerhard Munthe (1849-1928) which absorbed the new Impressionism in Munich and Paris. He painted Norwegian landscape and is also known for his portraits of Hendrik Ibsen and of Bjørnstjerne Bjørnson (National Gallery, Oslo). W. was also famous as a black-and-white artist, his fairy-tale illustrations showing fancy and humour.

Werfel, Franz (1890-1945), Austrian poet, novelist, and playwright, b. of Jewish stock at Prague, and educ. at Prague and Hamburg. He lived chiefly in Vienna from 1918, and went to the

U.S.A. in 1940. W. wrote verse, dramatic works (*Der Spiegelmannsch*, 1920 and *Paulus unter den Juden*, 1926), short stories, and novels, largely psychological. His most famous novels are *Verdi*, *Roman der Oper*, 1924, and *Das Lied von Bernadette*, 1941. See lives and studies by A. Luther, 1922; R. Specht, 1926.

Wergeland, Hendrik Arnoldus (1808-45), Norwegian poet, b. Kristiansand. After passing through Kristiania Univ., he pub. a successful dramatic satire which fired the young Ibsen's ambitions. His friends called him the 'Schiller of Norway.' W. entered the clerical profession in 1829, but in 1843 resigned, the sentiments expressed in a poem entitled *Creation, Man and the Messiah*, being deemed incompatible with his cloth. He studied medicine for some years and pub. a treatise on cholera in 1839, but abandoned that line of work for a literary life. He was appointed assistant librarian at Kristiania Univ., given a 'literary pension' in 1839, and in 1840 became keeper of the state archives. His popular influence has continued to this day, being a product of the constant attacks on him by Welhaven (q.v.) and his fervent nationalism. He is Norway's patriot-poet and is as much loved for his idealism as for his not always consistent writings. His death was the cause of national mourning. He is best known for extraordinarily beautiful lyrics, which reveal a deep love of nature, and a rich imagination; but his other work has often been surpassed. A collected ed. of his works was begun in 1918. See J. Handegard, *Wergeland og Welhaven*, 1915; E. Gordon, *Wergeland, the Prophet*, 1938; H. Beyer, *H. Wergeland*, 1946; H. Møller, *H. Wergeland*, 1947.

Wergeland, Jakobine Camilla, see COLLETT.

Wergild, or **Wer-geld**, in A.-S. times a money compensation for murder or manslaughter. Every man's life had a fixed pecuniary value called the W., the amount graduated according to the rank of the person slain. The W. of a murdered freeman was payable as compensation to his kin; that of a serf was paid to his master.

Werner, Abraham Gottlob (1750-1817), Ger. geologist, was b. Wehrau, Saxony. He became prof. of mineralogy at Freiberg in 1775, and taught that all rocks were marine and championed the 'Neptunists' against the 'Plutonists' led by Hutton (q.v.), who maintained that igneous rocks had solidified from molten material. W. is regarded as a founder of mineralogy and petrology.

Werner, Alfred (1866-1919), Swiss chemist of Fr. extraction, b. Mülhausen. He held the professorship of chemistry at Zürich from 1893 till 1919, and was awarded the Nobel prize in 1913. His prin. contribution to chemistry was his theory of co-ordinate valency based upon his study of complex metal-ammonia compounds. This theory has been largely incorporated in modern hypotheses as to the nature of valency (q.v.), and represented remarkable insight into the mechanism of chemical combination.

Wernher, Sir Julius Charles (1850-1912), Anglo-Jewish financier, b. Darmstadt. He was educ. at Frankfurt-on-Main, and there gained experience in a bank. He went to S. Africa in 1871, as an assistant in a Fr. diamond-house. In 1888 he became governor of De Beers, and in 1890 senior partner in Wernher, Beit, & Co. He was made a baronet in 1905. He gave large amounts to charitable and educational concerns.

Wernigerode, Ger. tn in the dist. of Magdeburg, at the foot of the Harz Mts, 40 m. SW. of Magdeburg (q.v.). It once belonged to the Hanseatic League (q.v.). Its castle was formerly the seat of the princes of Stolberg-W. There are engineering and chemical industries. Pop. 35,000.

Werther, see under GOETHE, JOHANN WOLFGANG VON.

Wervik, tn in the prov. of W. Flanders, Belgium, on the R. Lys, close to the Fr. border, 10 m. WSW. of Courtrai. Until the 14th cent. it was a very important commercial tn and had more than 50,000 inhab. in the 13th cent. It is now engaged in agriculture, and tobacco is largely cultivated. Pop. 12,300.

Wesel, Ger. tn in the Land of N. Rhine-Westphalia (q.v.), at the confluence of the Rhine (q.v.) and the Lippe, 30 m. N. by W. of Düsseldorf (q.v.). It was almost razed during the Second World War, but has been rebuilt on modern lines. The Gothic cathedral of St Willibrord dates from the 15th cent. The tn is an important communications centre. Pop. 25,000.

Weser, one of the largest rivs. of Germany, formed by the junction of the Werra and the Fulda, the latter of which rises in the Rhön Mts, in Bavaria. From the junction at Münden (q.v.) the riv. flows towards the N. Sea, into which it falls after a course of 225 m. The lower reaches are canalised, and the riv. is navigable by ocean steamers to Bremerhaven, and by smaller vessels to Bremen (qq.v.).

Wesermünde, see BREMERHAVEN.

Wesley, Charles (1707-88), hymn-writer, brother of John W. (q.v.), b. Epworth, Lincs, and educ. at Westminster School and Christ Church, Oxford. He helped his brother in furthering the cause of Methodism. His greatest contributions were the hymns he wrote, numbering over 6000, and including such well-known examples as *Jesu, Lover of My Soul* and *Love Divine, All Loves Excelling*. See also METHODISM. His *Journal* was ed. by T. Jackson, 1849. See also T. Jackson, *Life and Correspondence of Charles Wesley*, 1841; life by J. Telford, 1887; F. L. Wiseman, *Charles Wesley, Evangelist and Poet*, 1933.

Wesley, John (1703-91), founder of Methodism, b. Epworth, Lincs, a younger son of Samuel W., rector of Epworth and Wroot, and author of many poems. W. was educ. at Charterhouse, London, and Christ Church, Oxford, being elected scholar there, and took holy orders in 1725. He served his father as curate at Wroot from 1727 to 1729, and then returned

to the univ. as tutor and fellow in Lincoln College, which position he retained for 6 years. At Oxford his younger brother, Charles W. (q.v.), had formed a small group of undergraduates who followed very strictly the ordinances of the Church and were dubbed by their friends 'Methodists.' W. joined the party and became its leader. Soon after his father's death in 1735, he went to America to take charge of the Georgian mission, but in the following year retired from the charge. On his return he came under the influence of Peter Bohler, a Moravian, and became a member of that society's chapel at Fetter Lane, London. At about this time he experienced a personal conviction of salvation; it was from this time that his new movement developed. In 1739 he began open-air preaching at Bristol. In 1742 he went to Yorks and Newcastle-upon-Tyne, and his teaching took root everywhere. He is said to have delivered at least 40,000 sermons. He and his brother Charles, Whitefield, and others set up an independent society which met at the Foundry near Moorfields, London. W. made Bristol his H.Q., and he divided his followers into classes, each class being under the direction of a leader. Rules for the conduct of the classes were drawn up in 1743. He preached all over the country, and was especially successful with the poorer classes, who were less in touch with the Estab. Church than the well-to-do. It was not until 1784 that W. executed the 'deed of declaration,' from which dates the beginning of modern Methodism. At W.'s death his followers numbered 100,000. He preached his last sermon at Leatherhead, 23 Feb. 1791. *See also* METHODISM. W. wrote many books and pamphlets, and ed. the first popular series—*The Christian Library*. W.'s *Journals* (ed. by N. Curnock), 1909-16, are the best authority for his career. The 11th ed. of his *Works* appeared in 1856-62, and his *Letters* were ed. by J. Telford, 1931. *See* lives by R. Southey, 1820; C. T. Winchester, 1906; W. H. Fitchett, 1906; C. E. Vulliamy, 1931; B. Dobrée, 1933; J. Laver, 1933; Marjorie Bowen, 1937; G. E. Harrison, *Son to Susanna—the Private Life of John Wesley*, 1937, 1944; M. Plett, *John Wesley in the Evolution of Protestantism*, 1937; N. Sykes, *Wesley and the Methodist Movement*, 1950.

Wesley, Samuel (1766-1837), son of Rev. Charles W. of Bristol, nephew of the Rev. John W. He was a celebrated musical prodigy, writing an oratorio, *Ruth*, at 8. He became one of England's finest organists, and devoted considerable energy to popularising J. S. Bach.

Wesley, Samuel Sebastian (1810-76), Eng. organist and composer, son of Samuel W. (see above), b. London. One of the finest organists of his day, his appointments included Hereford Cathedral (1833-5), Leeds par. church (1842-9), and Gloucester Cathedral (1865-76). He left much magnificent church music, anthems, services, and organ pieces. *See* life by J. T. Lightwood, 1937.

Wesleyan Methodist Churches, *see* METHODISM.

Wesleyan Reform Union. The W. R. U. arose before 1850, attracting dissentients from the ideas of Jabez Bunting (q.v.). Of all the splinter churches the W. R. U., together with the Independent Methodist Church, is the only one surviving; they declined to come into the general union of all the Methodist Churches in 1932.

Wessel, Caspar (1745-1818), Norwegian surveyor and mathematician. He was the pioneer of the modern method of representing complex numbers (q.v.).

Wessex (O.E. *West saxe*, West Saxons). The chalk uplands of W. form an archaeological prov., the distinctive cultures of which can be demonstrated from the time of the Bronze Age. There was a natural geographical route for sea traffic between Normandy and Hants, with a western spread to Dorset, which was in use in Neolithic times. At the heart of W., and the key to its archaeology, is Salisbury Plain. The historical kingdom of W. is said to have been founded by the West Saxons or Gewissas, under Cerdic (q.v.) and his son, Cynric, in AD 519. The invaders were defeated at Mons Badonicus (520), but won a great victory at Cerdic's death (527). Cerdic d. in 534, and Cynric extended his kingdom beyond Hants. His son, Ceawlin (560-91), was a war-like king and made repeated inroads upon his Brit. neighbours. But his reign ended in confusion and disaster. In 592 his own subjects rebelled against him at Woddesbeorg, and Ceawlin d. in exile the following year. The ter. he had conquered beyond the Thames was seized by the Mercians, and W. ceased to be a powerful state. In the 7th cent. the West Saxons were converted to Christianity. During the reign of Cuthred (c. 741-56) the Mercians were defeated at Burford (752) and a code of laws drawn up. Egbert (802-39), who had spent his youth in exile at the court of Charles the Great, restored W. to its former power, and ultimately conquered the whole of England. He defeated the men of Cornwall in 815 and 835, subdued Mercia (825-29), annexed Kent, Sussex, and Essex, and before 828 was acknowledged overlord by all the peoples S. of the Tweed. W.'s ter. was increased and her power strengthened under Alfred (q.v.). He and his son Edward the Elder transformed the kingship of W. into that of England; W. lost its political individuality, and the name became only a geographical term. *See also* ENGLISH HISTORY; HARDY, THOMAS. *See* G. J. Copley, *The Conquest of Wessex in the Sixth Century*, 1954.

West, Benjamin (1738-1820), Amer. historical painter, b. Springfield, Pennsylvania. He began portrait painting at 16, but in 1760 went to Italy to study, and settled in London in 1763. Here he came under the notice of George III and soon acquired a great reputation. His 'Death of Wolfe,' 1770, won deserved fame for its portrayal of the hero and his companions in contemporary dress, instead of that of classical antiquity, and did much to establish a new approach to historical painting. On the death of Reynolds he

was made president of the Royal Academy. See study by H. E. Jackson, 1900; and J. T. Fexner, *America's Old Masters*, 1939.

West, Rebecca, pen-name of Cicily Isabel Fairfield (1892-), novelist and critic, b. co. Kerry. Educ. at George Watson's Ladies' College, Edinburgh, she studied at a London dramatic academy and was on the stage for a short time. She took the pseudonym Rebecca West from the heroine of Ibsen's *Rosmersholm*, one of the parts she had played. In 1930 she married Henry M. Andrews, a banker. Her earliest book was a study of Henry James, 1916, and in 1930 she wrote *D. H. Lawrence, an Elegy*. *Black Lamb and Grey Falcon*, 1941, tells of a trip through Yugoslavia in 1937. Her novels include *The Return of the Soldier*, 1918, *The Judge*, 1922, *Harriet Hume*, 1929, *The Harsh Voice*, 1936, *The Thinking Reed*, 1936, and *The Fountain Overflows*, 1957. She also wrote 2 books about the Nuremberg war trials. In 1949 she was made a C.B.E.

West, Victoria Sackville-, see SACKVILLE-WEST.

West Africa, British, see GAMBIA; GHANA (GOLD COAST); NIGERIA; SIERRA LEONE.

West Africa, French, see DAHOMEY; FRENCH EQUATORIAL AFRICA; FRENCH GUINEA; IVORY COAST; SUDAN; FRENCH.

West Africa, German, see AFRICA, SOUTH-WEST; CAMEROON; TOGOLAND.

West Africa, Portuguese, see ANGOLA; PORTUGUESE GUINEA.

West Africa, Spanish, see FERNANDO PO; RIO DE ORO; SPANISH GUINEA.

West African Frontier Force, The Royal, and **West African Division** (81st and 82nd). The R.W.A.F.F. was formed in 1901 mainly at the instigation of Lord Lugard, though in the 17th cent. the merchants had formed various forces, composed of local tribesmen, to protect their forts against raiders of all kinds. The Royal African Colonial Corps of Light Infantry was formed by Sir Charles McCarthy in 1822, and at the same time 2 other forces were raised: the Royal Cape Coast Militia and the Royal Cape Coast Volunteer Force. All these units were stationed in what is now known as Ghana. A force was raised from Hausas of Nigeria, as it is now known, in 1862: it was first known as Glover's Hausas, then the Hausa Militia, and, finally, the Lagos Constabulary. It took part in the Ashanti war in 1873-4, and won the first battle honour of the Nigeria Regt. A detachment of this unit, left behind when the main body returned to Nigeria, formed the nucleus of the Gold Coast Regiment. In Nigeria there was also the Niger Coast Constabulary. It was a fighting force of about 1 battalion strong and had some guns. A third force, the Royal Niger Constabulary, composed of Hausas and of Yorubas, from W. Nigeria, had a high reputation in battle and also took part in the Ashanti wars.

In 1901 a regular force of African troops financed from Brit. funds was formed, and

it became known as the W. African Frontier Force. By 1914 it consisted of the Gold Coast and Nigeria Regiments, and 2 battalions from Sierra Leone and Gambia. The R.W.A.F.F. now comprises the Nigeria, Ghana, Sierra Leone, and Gambia Regiments, together with the supporting units in each of the ters. from which these regiments are drawn. These troops fought in Togoland, the Cameroons, Duala, and Palestine. On 16 Mar. 1928, King George V conferred on it the title of 'Royal.'

In the Second World War units of the R.W.A.F.F. played a notable part in the defeat of the Italians at Bullo Erillo and in the capture of Merca, which led to the fall of Mogadishu. In 1943 2 newly formed divs. went to the E. and took part in Wingate's second Chindit expedition and the fighting in the Arakan peninsula. See also BURMA, SECOND WORLD WAR, CAMPAIGNS IN.

West African Indigenous Art, see NEGROES.

West Allis, tn. of Milwaukee co., Wisconsin, U.S.A., incorporated in 1906. It manufs. heavy machinery, trucks, motors, wood products, etc. Pop. 43,000.

West Bengal, see BENGAL, WEST; BENGAL, PRESIDENCY OF.

West Bromwich, parl., municipal, and co. bor. of Staffordshire, England, 6 m. N.W. of Birmingham, situated on the edge of the 'Black Country' dist., immediately contiguous to the boundaries of the cos. of Warwick and Worcester, and adjoining Birmingham. The dist. gradually changed from a collection of hamlets on the Tame as small ironworks appeared. The primary cause of the tn's subsequent rapid development was the discovery of coal near by. Brindley's canal, completed in 1769, passed through W. B. Ancillary industries soon developed in W. B., and forges, furnaces, and foundries were erected. Then coal was discovered in the township itself and expansion became rapid. In 1819 the pop. was 9000: by 1854 it had risen to 36,500. Yet the bor. is not a completely built-up area and more than one-quarter of its 7000 ac. is still given over to agriculture. Heavy engineering and corollary industries are much in evidence in W. B., but the tn is also the centre of a variety of industries and trades. Pop. 88,000.

West Calder, vil. and dist. (incl. Addiewell) of Midlothian, Scotland, 16 m. from Edinburgh. Shale is mined in the dist., and crude oil and its many by-products form the chief industries. There are sev. coal mines in the area. Pop. (vil.) 5500; (dist.) 8000.

West Chester, bor. and co. seat of Chester co., Pennsylvania, U.S.A., 25 m. W. of Philadelphia. It has large mrkt gardens and dairy farms and manufs. metal products, canned goods, machinery, hosiery, and lumber products. A state teachers' college is here. Pop. 15,170.

West Flanders (Flem. *West-Vlaanderen*), most westerly prov. of Belgium, bounded on the E. by the Netherlands and E. Flanders, S. by Hainaut and France, W. by France, and NW. by the

N. Sea for about 40 m. As in E. Flanders, the country is flat. The soil of the polders is very productive, and the plain of Flanders is well cultivated. Agriculture and cattle breeding are the chief occupations of the inhab. Flax, hops, and tobacco are grown. The people are also engaged in fishing, and in weaving, spinning, lace-making, bleaching, etc. In the narrow unfertile belt of sand dunes lie close to each other the famous seaside resorts of which Ostend and Knokke are the most important. Other important towns are Bruges (the cap.), Ypres, and the industrial centres of Courtrai, Mouscron, Roeselare, Menin, and Izegem. Area 1248 sq. m.; pop. (1955) 1,032,170. *See also* FLANDERS.

West German Republic, *see* FEDERAL GERMAN REPUBLIC.

West Ham, pari. and co. bor. of Essex, England, and an E. suburb of London, adjoining E. Ham. There are sev. manufs., and many workers are employed at the docks and the Stratford railway shops. During the Second World War W. H. was very heavily bombed. The pop. before the War was 270,000. The redevelopment scheme is based on a maximum pop. of 165,000.

West Hartlepool, modern tn built round the old vil. of Stranton, a co. bor. of Durham, England, on the N.E. coast some 4 m. N. of the mouth of the Tees. The charter of incorporation was obtained in 1887. The main heavy industries are steel manufs., shipbuilding, and engineering, but since the Second World War new light industries have been developed. The tn has its own seaside resort at Seaton Carew, which is within the co. bor. Pop. 72,597.

West Haven, tn of New Haven co., Connecticut, U.S.A., on New Haven harbour. It manufs. aeroplane and gun parts, tyres, textiles, tiles, machinery, tools, hardware, pipe organs, beer, fertiliser, and buckles. Pop. 32,000.

West Highland White Terrier, breed of dog probably descended from the Cairn Terrier (q.v.), but existing as a separate breed for nearly a cent., and known as the Poltalloch Terrier when first exhibited. Dogs weigh from 14 to 18 lb. and bitches about 2 lb. less; its height is from 8 to 12 in. at the shoulder.

West Highlander Breed, *see* CATTLE.

West Hothly, vil. and par. of Sussex, England, 6½ m. from E. Grinstead. The church dates from the 13th cent., with traces of Norman work; and there is a 14th-cent. priest's house, now a museum. Pop. 1700.

West India Regiment. The regiment was formed in 1779 from Loyalist settlers who flocked to join the Brit. expedition against Savannah, Georgia. These settlers formed the S. Carolina Regiment, and the association with S. Carolina is commemorated by the crossed wreaths of laurel and Carolina laurel borne on the appointments. After the War of Independence the regiment was removed to Jamaica. In 1782 it had white and black troops. Recruits were obtained from the Negro slaves shipped from W.

Africa and were known as King's Men. After the abolition of slavery in 1841 W. Africans were still engaged, and the regiment permanently maintained 2 recruiting companies in Sierra Leone and Gambia, but from about 1880 onwards all recruiting was from the W. Indies. The officers were always British, as were most N.C.O.s, who were promoted from Brit. regiments of the line. In 1803 the regiment, which was now known as the 1st W. India, took part in the defence of Dominica, and, in 1809, in the conquest of Martinique and Guadeloupe. In the 19th cent. the regiment saw service in Central and S. America, and in the Ashanti Wars. In the Gambia campaign of 1892, 2 V.C.s were won, both by W. Indians.

In the First World War the 1st Battalion served in the Cameroons campaign and the 2nd Battalion in E. Africa. An additional W. Indian Corps, the Brit. W. Indies Regiment, was raised in 1915. This eventually comprised 11 battalions. The 1st and 2nd Battalions were sent to Egypt in 1916, followed by the 3rd and 4th. In the same year the 3rd and 4th were ordered to France as ammunition carriers, and successive battalions did service either as ammunition carriers or labour battalions in France. The 1st and 2nd Battalions saw fighting in Palestine, and a unit of 500 men took part in the E. African campaigns. The Brit. W. Indies Regiment was disbanded immediately after the war and the W. I. R. in 1927. These were revived during the Second World War as the Caribbean Regiment, which was mainly engaged on garrison duties in the W. Indies. The Caribbean Regiment was disbanded in 1947, but its Jamaican and Barbados battalions survive as the Jamaica and Barbados Regiments.

See A. B. Ellis, *History of the First West India Regiment*, 1885; J. E. Caulfield, *One Hundred Years' History of the 2nd West India Regiment*, 1890.

West Indies, archipelago extending in a curved chain from the Florida Channel (N. America) to within 7 m. of the coast of Venezuela (S. America), i.e. between 27° and 10° N. lat., and varying in size from 44,218 sq. m., the area of Cuba, to a few ac. They and their waters represent the Sp. Main of hist. and romance and, with the N. coasts of Central and S. America, enclose the Caribbean Sea, lying across the trade routes to the Panama Canal. The is. were called the W. I. because Christopher Columbus, who discovered them, believed when he cruised round Hispaniola (Santo Domingo) that he had reached India by a W. route. The alternative name is the Antilles. The total land area is nearly 100,000 sq. m., of which 73,742 sq. m. are independent, 12,500 Brit., 3556 Amer., 986 Fr., 403 Dutch, and 90 Venezuelan. (This area excludes Brit. Guiana, Brit. Honduras, Curaçao, and Netherlands Guiana or Surinam, which, having much in common with the W. I., are occasionally mentioned in this article; but includes the Bahamas, which lie outside the W. I. proper.) The archipelago may be divided

into 3 groups: (1) the Greater Antilles, consisting of Cuba, Haiti, and the Dominican Rep., all independent; Jamaica, and its dependencies (Turks and Caicos Is., and the Caymans), Brit.; and Puerto Rico, U.S.A.; (2) the Bahamas, Brit.; and (3) the Lesser Antilles, the semicircle of smaller is. to the E. of the Greater Antilles.

The Lesser Antilles are divided among Great Britain, France, the Netherlands, the U.S.A., and Venezuela. In 1917 the U.S.A. bought the Virgin Is., formerly the Dan. W. I., from Denmark, the total area that changed hands being 132 sq. m. The Spanish called the Lesser Antilles, which are exposed to the prevailing NE. winds, the Windward Is. (*Islas de Barlovento*), and the Greater Antilles, the Leeward Is. (*Islas de Sotavento*), from their more sheltered position; but these terms are now applied exclusively to 2 entirely different groups of Brit. Is. The Windwards include Grenada, St Vincent, the Grenadines, St Lucia, and Dominica, forming the E. barrier to the Caribbean Sea between Martinique and Trinidad. The Leewards include Antigua (with Barbuda and Redonda), St Kitts-Nevis (with Anguilla and Sombbrero), Montserrat, and the Virgin Is. (the largest being Virgin Gorda). The Amer. Virgin Is. comprise St Thomas, St Croix, St John, and some neighbouring islets. The Fr. is. are Guadeloupe, with its dependencies Marie Galante, Les Saintes, Désirade, St Barthélemy, and St Martin, and Martinique. Curaçao and its dependencies, Aruba, Bonaire, and other is. are Dutch; and Margarita is Venezuelan.

Geology, Relief, and Hydrography. Most of the W. I. are of volcanic origin, though some, especially the Bahamas, are of coral formation. Many of the almost land-locked harbours, such as Castries, are craters of extinct volcanoes. The W. I. are really the peaks of a submerged range of mts known as the Caribbean Andes, which in the Tertiary period formed a link between N. and S. America. There is practically no running water in the W. I., though there are ample underground supplies. In the W. of Cuba are the Sierra de los Órganos, reaching a height of over 2500 ft, and at the extreme E. end of the is. is a range of mts facing S., the Sierra Maestra (4000 ft mean altitude); but the is. is divided into 2 parts by a large marshy depression 47 m. wide, between the N. and S. coast. In consequence of Cuba being largely composed of limestone, the drainage is partly underground, and many rivers are lost in swamps. Hispaniola (Dominican Rep. and Haiti) is generally mountainous, the highest summit exceeding 10,000 ft. Puerto Rico is an elevated plateau with a large number of rivers. In Jamaica the Blue Mts exceed 7000 ft, but in the centre and W. is a limestone plateau with deep valleys with self-contained drainage. S. of Puerto Rico the is. form a deeply submerged mt ridge separating the Caribbean Sea from the Atlantic Ocean.

Climate. The climate of the W. I., generally speaking, is healthy for Europeans, especially during the winter in the

season of the NE. trade winds. Many of the is. are subject to hurricanes from Aug. to Oct.

Ethnology and Religion. The races inhabiting the W. I. when Columbus reached them were Arawak and Carib Indians. The Arawaks of the large is. were soon exterminated, chiefly by the Spanish. There are still families of almost pure-blooded Caribs in Dominica and in St Vincent. Negroes have increased since their emancipation, and quite two-fifths of the total pop. are now of Negro or mixed blood. There has been also a considerable influx of labour from India to work in the plantations. Chinese, who came in smaller numbers, have all abandoned estate work for trade or professions. In the Guianas there are numbers of Indonesians. In Cuba and Puerto Rico whites are in the majority, but they are greatly outnumbered in the other is., and in Haiti practically the whole pop. is Negro.

The Negroes are generally nominally Protestant, but in Cuba and Puerto Rico the religion is Rom. Catholic, the people being of Sp. descent. The Brit. colonies, except those taken from Spain or France, are mostly Protestant.

The hist. of the Brit. and other colonies in the separate articles on the different is. indicates the origin and progress of the white pop. of the W. I.

Slavery and the Slave Trade. The Spanish were the first to carry slaves from Africa to the W. I. At the end of the 16th cent. the Dutch entered the trade, and in 1662 and 1672 Eng. 'African Companies' were formed to carry on the trade. At the end of the next cent. some 25,000 Negroes were shipped annually to the Brit. colonies. In 1807 an Act was passed in the Commons for the abolition of the trade, and in 1834 slavery was abolished. Slavery was finally abolished in the Fr. W. I. in 1848; in the Netherlands W. I. in 1863; and in Puerto Rico in 1873. Slaves were gradually manumitted in Cuba under an Act of 1879, total abolition being decreed in 1886.

Production. The flora of the W. I. is of great variety and richness. The sugar cane and tobacco plant are extensively grown, bananas, citrus, and cocoa are exported, and among other crops are beans, peas, rice, maize, and Guinea corn. Forests are numerous and wide-spreading, and produce valuable woods and abundant fruits. Palms are in great variety, and there are sev. species of gum-producing trees. Where possible, cattle-breeding is practised. Goats and large flocks of sheep are kept. Trinidad boasts a famous natural phenomenon, a pitch lake which provides asphalt for export, recent ann. production being about 143,000 tons. Trinidad also produces petroleum. Jamaica has large deposits of bauxite.

The Cane-sugar Industry. The total production of cane-sugar in the W. I. in the year 1853-4 was 10,000,000 tons (estimated), total world production being some 35,000,000 tons. The extension of the beet-sugar industry has caused a slump in the cane-sugar industry, but

various factors have combined to improve the position in the Brit. W. I.

West Indian Development. Economic distress led to widespread rioting in the Brit. W. I. in 1938, and a Royal Commission was appointed to inquire into conditions there. Its recommendations were embodied in the Colonial Development and Welfare Act of 1940 (see COLONIAL DEVELOPMENT AND WELFARE), which provided funds for the social and economic improvement not only of the Brit. W. I. but of all the Brit. dependencies. A comptroller with a staff of expert advisers was appointed to the Brit. W. I. to assist W. I. govts. in pro-

Tobago, and the Windward Is. The federal legislature consists of a governor-general, a senate, and a house of assembly, making a div. of powers on lines rather similar to the general pattern of the Australian constitution. The federal cap. will be sited in Trinidad. The estab. of the federation is seen as a final step towards the attainment of full dominion status (q.v.), the combination of the Is. into a larger economic unit helping them to attain collective self-sufficiency and an enhanced bargaining power in negotiation. Provision is made for the subsequent adherence to the federation of Brit. Guiana or Brit. Honduras if their peoples



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TRINIDAD: WORKERS AT THE PITCH LAKE

paring development plans which their Colonial Development and Welfare grants helped to finance. Grants and loans to the Brit. W. I. (including Brit. Guiana and Brit. Honduras but excluding the Bahamas) approved under the first and subsequent Colonial Development and Welfare Acts amounted at the end of Mar. 1956 to nearly £35m. The W. I. also benefited from certain carefully administered schemes. The Colonial Development Corporation (q.v.) operates 18 projects in the Brit. W. I. with a total authorised capital of £7,500,000. The problems of the Brit. W. I. spring largely from over-population and economies insufficiently diversified.

West Indian Federation. A series of conferences beginning at Montego Bay, Jamaica, in 1947 led to the signing in London in 1956 of an agreement to set up a federation of the W. I. comprising Barbados, Jamaica, the Leeward Is. (excluding the Virgin Is.), Trinidad and

declare themselves in favour—which up to date they have not done. Lord Hailes was appointed first governor-general in 1957. See also articles on separate Is.

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Burn, *Emancipation and Apprenticeship in the West Indies*, 1937; M. Crouse, *The French Struggle for the West Indies*, 1943; Sir Alan Burns, *History of the British West Indies*, 1955; J. H. Parry and P. M. Sherlock, *A Short History of the West Indies*, 1956.

West Kazakhstan, oblast (prov.) of the Kazakh S.S.R., extending to the W. and NW. frontiers of the rep. Livestock raising is main occupation, but wheat and millet are grown in the N. Pop. 360,000.

West Kent Regiment, The Queen's Own Royal, formerly the 50th and 97th Regiments. The 50th was raised as the 52nd in 1755 and was renumbered in 1756. The title 'West Kent' was adopted in 1782. The 50th became Queen's (Adelaide's) Own in 1831, having served in Egypt, the Peninsula, and in India. It formed part of Sir John Moore's columns on the retreat to Corunna. The 97th Foot, raised in 1824, fought in the Crimea and in the Indian Mutiny. Since the amalgamation of the 50th and 97th in 1881 the regiment has served in the Egyptian and Sudanese campaigns of the eighties, in S. Africa, and in both world wars. Eighteen battalions were raised in 1914-18, and 11 of them served in France, Italy, Gallipoli, Palestine, and Mesopotamia.

In the Second World War both regular and Territorial battalions served in France up to June 1940; the fourth battalion was at the taking of Kohima in Burma, and others fought in the Mediterranean. The W. Kents and the Buffs are to be amalgamated by 1962. See H. D. Chaplin, *The Queen's Own Royal West Kent Regiment, 1920-1950*, 1954.

West Kirby, holiday resort of Cheshire, England, at the mouth of the Dee in the Wirral Peninsula, 8 m. from Birkenhead. It has a large marine lake and sporting facilities. It is part of the urb. dist. of Hoylake (pop. 31,200). Pop. 17,000.

West Lothian, formerly Linlithgowshire, co. of Scotland, bounded by Lanarkshire and Stirlingshire to the W. and NW., Midlothian to the E., and the firth of Forth to the N. The E. termination of the Antonine Wall is just S. of Bo'ness. The interior is hilly in the S., with heights of up to 1000 ft. and there is a low coastal belt. The Avon and the Almond are the only rvs., and Linlithgow Loch the only lake. Arable and considerable dairy farming is carried on, with oats, barley, grasses, wheat, and potatoes the chief crops. Coal and fireclay are extensively mined, and there is an important shale-oil industry. There are steel and iron foundries, engineering works, also chemical, fertiliser, refractories, and electronic equipment manufs., and sev. distilleries and paper mills in the co. Linlithgow is the co. tn, other tns being Bathgate (with important railway marshalling yards), South Queensferry, Bo'ness (with a harbour and docks), Armadale, Whitburn, and Broxburn. The co. returns 1 member to Parliament. Area 120 sq. m.; pop. 90,112.

West Lulworth, and East Lulworth, 2 vils. of S. Dorset, England. W. L. is 8 m. from Wareham, and near by in the

par. are Lulworth Cove, a famous beauty spot and bay about 500 yds across almost enclosed by hills, and Durdle Door. E. Lulworth, with the Purbeck Hills and woodlands, is one of the most famous beauty spots in the country. Near Lulworth Castle (destroyed by fire in 1929) at E. L. stands the Rom. Catholic chapel, built in 1786, and the first to be erected openly as such in England since the Reformation (apart from those attached to foreign embassies, etc.). Pop. (of W. L.) 650; (of E. L.) 300.

West Malling, see EAST MALLING.

West New York, tn in Hudson co., New Jersey, U.S.A. Its chief manufs. are radio parts, clothing, textiles, embroidery, leather goods, and toys. Pop. 37,680.

West Orange, tn of Essex co., New Jersey, U.S.A., adjoining Orange co., and 13 m. W. of New York city. It was chartered as a tn in 1900. The Edison plant produces electrical accessories; Edison estab. laboratories and his home here in 1887. Other manufs. are metal products, tiles, and clothing. There are stone quarries and some poultry-keeping. Pop. 28,600.

West Palm Beach, tn of Florida, U.S.A., co. seat of Palm Beach co., c. 70 m. N. of Miami. It is connected by bridges and ferry with Palm Beach, for which it is the traffic and business centre. It is a port of entry, with a deep harbour, and a fashionable resort. It manufs. air-conditioning equipment, prefabricated buildings, concrete products, mirrors, beverages, and preserves. Pop. 43,162.

West Point Military Academy. The U.S. Military Academy is situated at W. Point, on the r. b. of the Hudson R., in Orange co., New York, about 50 m. N. of New York city. With one or two exceptions the theoretical and practical instruction of the strength of 2496 cadets is carried on by commissioned officers, aided by detachments of enlisted men from the sev. arms and services. Cadets are appointed between the ages of 17 and 22 years (or 19 and 22 years if selected from the Army or the National Guard); and the course of study is 4 years, and upon graduation cadets may be commissioned as second-lieutenants in the Regular Army. See S. Forman, *West Point*, 1955; Col. F. P. Todd, *Cadet Gray*, 1955; J. Engeman, *West Point, the Life of a Cadet*, 1956.

West Prussia, former Prussian prov. with a coast-line on the Baltic, between Pomerania and E. Prussia (qq.v.). Its ter. was acquired from Poland in the partition of 1772, and from 1824 to 1878 it was amalgamated with E. Prussia. Part of W. P. passed to Poland and Danzig (q.v.) in 1918, but was retaken by the Germans in 1939. The ter. of W. P. now forms part of the Polish provs. of Gdańsk and Bydgoszcz (qq.v.).

West Riding Regiment, see DUKE OF WELLINGTON'S REGIMENT.

West Saxon Dialect, see ENGLISH LANGUAGE.

West Surrey Regiment, see QUEEN'S ROYAL REGIMENT (WEST SURREY).

West Virginia, the 'Panhandle State,' S. Atlantic state of the U.S.A., separated from Virginia in 1863. It has an area of 24,181 sq. m., and is bounded on the N.E. by Pennsylvania and Maryland, on the S. and E. by Virginia, and W. by Kentucky and Ohio. It is about 240 m. long from N. to S. and 160 m. broad. The Ohio R. forms the W. boundary of the state and many of its tribs. flow through it. The Potomac forms part of the N. boundary, while the Allegheny and Shenandoah Mts border the S.E. The climate is agreeable and healthy. About 60 per cent of the soil is covered with forest; W. V. produces more hardwood than any other state, except Arkansas. The soil is fertile, and many of the mts are topped with flat meadows. The chief agric. crops are Indian corn, wheat, oats, rye, buckwheat, potatoes, hay, and tobacco. The chief fruits grown are grapes, apples, plums, peaches, and pears. Farming units are small, averaging about 89 ac. Soft coal, natural gas, petroleum, and stone are produced. Manufs. include iron and steel products, glass, and chemicals. Primary education is free for all from 6 to 21 years, and compulsory between the ages of 7 and 16. W. V. has 25 institutions of higher learning—9 colleges and univs., teachers' and junior colleges, and 3 negro colleges. Pop. (1950) 2,005,552. The state cap. is Charleston (q.v.), but among the most important cities is Wheeling (q.v.), where most of the important industries, except salt manuf., are located. The largest city is Huntington (q.v.); other tns are Clarksburg, Parkersburg, and Fairmount (qq.v.). There are over 4000 m. of railway, and the state has a new system of improved highways totalling 33,000 m. There are 33 airports. There is a senate of 32 members and a House of Delegates of 94; W. V. sends 2 senators and 6 representatives to Congress. See C. H. Ambler, *West Virginia: The Mountain State*, 1940.

West Wall ('Siegfried Line'), Ger. line of fortifications constructed opposite the Fr. Maginot line before the Second World War. The first defences of the W. W., actually begun in 1934, passed between the R. Main and the Wetterau dist. and across the plain bounded by the Taunus and Vogelsberg. This line, about 100 km. long, ran from Aschaffenburg through Bieber, Gelnhausen, Wächtersburg, Büdingen, Stockheim, and Reichelsheim. Another line of defences ran from Moebach, at the foot of the Odenwald, Gundelsheim, Heilbronn, Laufen, and Beilighelm to the region between Leonberg and Sindelfingen, 15 km. W. of Stuttgart. Other defences in the former demilitarised zone ran along the ridge of the Black Forest, beginning S. of Pforzheim and ending on the Swiss frontier, and from Voreifel to the Palatinate. Later work was begun on the line of defences from the Emmerich region to the vicinity of Düsseldorf. The view taken by the Ger. general staff was that this huge fortified girdle could be held by very small forces against the entire Fr. and Belgian armies,

so that Germany's main offensives could be conducted freely elsewhere. After the Second World War had begun the Germans extended the W. W. eastwards from its S. extremity at Basel to Lake Constance, for a length of about 100 m. along the Ger.-Swiss frontier.

The W. W. proved a formidable obstacle to the advance of the Anglo-Amer. armies, who, however, aided by the air forces, overcame the defences in about 6 months. One fatal flaw in the W. W. was that, in the Palatinate, and in the Eifelberg, the Germans were compelled to fight with the Rhine at their backs.

West Wycombe, see WYCOMBE, WEST.

West Yorkshire Regiment, The (The Prince of Wales's Own), formerly the 14th Foot, raised in 1685. It served at Namur (1695) and later at Gibraltar. From 1766 to 1778 it served in the W. Indies and America. It distinguished itself at Farnham, 1793, with which its regimental march 'Ca Ira' is associated. The regiment took part in Moore's retreat on Corunna, in Wellington's victory at Waterloo, in the capture of Bhurtpore, 1825, and in the Crimean, Afghan, and S. African wars. During the First World War it raised 31 battalions and served in France, Flanders, Italy, Gallipoli, and Egypt. In the Second World War some units of the regiment served on the W. front, others in N. Africa and Burma. The E. and W. Yorks Regiments were amalgamated in 1958 to form the Prince of Wales's Own.

Westbury, Richard Bethell, first Baron (1800-73), lawyer and politician, b. Bradford-on-Avon, and educ. at Bristol and Wadham College, Oxford. He was called to the Bar in 1823, and entered Parliament as a Liberal in 1851. He became solicitor-general, 1852, and attorney-general, 1856. In 1861 he was made lord chancellor with the title of Baron W. W. was especially interested in law reform, the first and second Statute Law Revision Acts being passed under his guidance. Popularly he was known for his biting sarcasm.

Westbury, markt tn of Wilts, England, 5 m. SSE. of Trowbridge, and an important railway junction. It has a fine old church with historic associations. The main industries of W. include leather working, the making of W. of England cloth, gloves, tobacco, food manuf., building, and there is a large engineering contracting firm. Pop. 5385.

'Westdeutsche Allgemeine', Ger. daily newspaper, founded in 1948. It is the largest paper in the densely industrial area of the Ruhr, and is pub. in Essen, with 22 local eds. in different cities of the Ruhr area. The paper has a circulation of 375,000, and enlarged week-end eds. with supplements on technical and legal matters, automobiles, and travel.

Westerham, markt tn of Kent, England, 5 m. from Sevenoaks, and 26 m. from London. James Wolfe was b. at the vicarage there, and lived at the house now known as Quebec House. Westerham Hill (810 ft) is the highest ground

in Kent. Sir Winston Churchill acquired Chartwell as his home in 1925. Pop. 3000. *Westerland, see SvLT.*

Westermark, Edward Alexander, (1862-1939), Finnish philosopher and sociologist. His *History of Human Marriage* and *The Origin and Development of Moral Ideas* were pub. in England. He was attached to the univ. of London from 1904 as lecturer in and later prof. of sociology and also held the Chair of Philosophy at Helsinki Univ.

Western Australia, state of the Commonwealth of Australia (q.v.), comprising nearly one-third of the Australian continent, or all that portion W. of 129° E. long. It is bounded on the NW. and S. by the Indian Ocean, and on the E. by N., Central, and S. Australia. The total area is 975,920 sq. m., extreme length from NE. to SW. 1480 m., extreme width from E. to W. 1000 m.

Physical Features. The S. and W. coast-lands are more or less flat and sandy, with comparatively few natural harbours or other indentations, until the Kimberley div. is reached, where the character of the coast becomes bold and broken, and fringed with numerous is. The total length of the coast-line is estimated to be 4350 m. The is. are generally unimportant. The greater portion of the far interior may be described as an immense table-land, with an altitude of from 1000 to 2000 ft above sea-level, the surface of which consists in parts of sand-dunes, varied by wide stretches of clayey soils. Long, straggling rivs., broken during the summer into a series of pools, cross the country as far inland as the hills extend, widening in many cases nearer the coast into large sea-estuaries. In the Kimberley dist. the prin. range of hills is the King Leopold Range, the highest point of which is Mt Broome (3040 ft). In the NW., between the Fortescue and Ashburton R.s. the highest range is the Hamersley, with Mt Bruce (4024 ft) in the vicinity. The Darling Range, which extends from Yatheroo in the N. to Point d'Entrecasteaux in the S., a distance of 300 m., reaches its highest elevation, 1910 ft above sea-level, at Mt Cooke in the Cockburn Sound dist. In the S. the loftiest range is the Stirling Range, with Bluff Knoll (3640 ft). Between it and the coast, and parallel with both, extends the less elevated Porongorup Range.

The prin. rivs. are: in the N., the Ord, with its tribs., Denham, Bow, Negri, and Panton; the Pentecost, with its trib., the Chamberlain; the Durack, Drysdale, King Edward, Prince Regent, Charney, Isdell, and the Fitzroy, with its tribs., the Margaret and Hann R.s and Christmas Creek; in the NW., the De Gray, with tribs., Oakover and Shaw; the Yule, Fortescue, and Ashburton, with its tribs., the Henry and Hardy. Draining into the W. coast are the Minilya, Gascoyne, with its trib., the Lyons; the Mooramel, the Murchison, the Greenough, the Swan, on which is Perth, which inland is called the Avon (W. A. was originally known as the Swan R. Settlement); the Murray, the Collie, and the

Preston; and, on the S. coast, the Blackwood, Donnelly, Warren, Deep, Frankland, Denmark, Hay, Kalgar, Pallenup, Gairdner, Fitzgerald, and Phillips R.s. There are no lakes of any considerable importance. Between the Darling Range and the coast are a few salt-water lagoons, and many fresh-water lakes, mostly nothing more than swamps during the dry season, and none of any economic importance. The so-called lakes of the interior, which are frequently of very considerable area, are, except after the occasional heavy rains, merely immense salt marshes. W. A., though not possessed of majestic mt heights, has a share of natural beauty as rich and varied as may be found, exhibited in, to name 2 features out of sev., the ruggedness of its hills and the grandeur of its forests. On the Warren R. in the SW. it is not unusual to find Karri trees which attain 300 ft in height. The most remarkable special feature is found in the many beautiful limestone caves, those of the Margaret R. being of exceptional grandeur and picturesqueness. The climate is most temperate, especially in the SW. where excessive cold is never, and excessive heat very rarely, known.

Land Settlement. Some two-thirds of the area of the state is suitable for pastoral purposes, immense tracts having been proved eminently so. The portion of the state more immediately fitted for agric. purposes and closer settlement is the SW. div. It has large areas specially suitable for mixed farming, dairying, potato and fruit growing, and large portions are covered with forests of considerable commercial value.

Production and Industries. It is now some time since the immense capabilities of the state as one of the world's great wheat producers were generally realised. During the period 1920-39 marked progress was made in the production of wheat and also wool. Until about 1900 the state did not produce enough wheat for its own requirements, but for some years past the export of wheat has been one of the state's chief assets. In 1919 the production of wheat totalled 11,222,950 bushels, and by 1924 this had been more than doubled. Between the latter year and 1930 the production increased from 23,887,397 to 53,504,149 bushels. In 1954-55, 34,300,000 bushels were produced from over 2,979,151 ac. Other crops included oats (9,584,559 bushels), barley (2,804,706 bushels), hay (305,052 tons), and potatoes (43,565 tons). From 1924 to 1929 the production of wool increased from 43,000,000 to 87,000,000 lb. The wool clip in 1948 was 93,000,000 lb. Fruit production has increased considerably in recent years and has created a large export trade to foreign markets. In 1954-55, 1,704,635 bushels of apples were produced, and 2322 tons of currants and raisins. Over 8951 cwt. of tobacco was grown. A very extensive portion of the SW. of the state, containing many millions of ac., is especially suitable for wheat-growing, whilst the hills of Darling Range and many other portions of the

state produce apples, oranges, grapes, and other excellent fruit in the greatest variety. Along the SW. coastal plain irrigation has been developed in 3 main areas totalling 72,000 ac. Stock raising and dairying are the chief beneficiaries.



Government of Western Australia
KALGOORLIE: POURING GOLD
AT CHAFFER'S MINE

For a long period lead and copper mines were worked in the vicinity of Geraldton, but activity gradually declined until the Second World War; lately there has been renewed interest in the field. Copper is found, however, in other dists., notably those of Mt Morgan, Phillips R., and W. Pilbarra. The other mineral resources of W. A. were almost unknown and quite undeveloped until about 1900. Gold was found in considerable quantities in the Kimberley goldfields in 1887 and this, attracting experienced miners, led to the discovery of great quantities at Coolgardie and Kalgoorlie in 1892-3. After the opening up of the goldfields of W. A., gold mining became for a time the prin. industry of the state, and indeed the state produces as much as 79 per cent of the total gold output of Australia. The aggregate output to the end of 1954 was

valued at £A363,284,275. The output in 1954 was 850,540 fine oz., valued at £A13,318,618. Good coal is found at Collie in the SW., and there is evidence of its existence in the Champion Bay and Irwin R. dists.; output in 1954 was 1,018,343 tons. Large deposits of stream tin were discovered in 1888 at Greenbushes, on the Blackwood R., and much tin has also been raised at Marble Bar. Other prin. minerals are arsenic, silver, asbestos, and pyritic ore. In 1953-54 the value of the total mineral output was £14m. Over half a million gallons of wine are made annually. Timber is also an important product, W. A. jarrah being known throughout the world for its durability. The value of timber exports is over £1m. annually. There are pearling banks at Broome and on the NW. coast generally. The more important exports of local products for the year 1954-55 with Australian currency values were wheat (£13,738,962), flour (£3,609,745), wool (£29,648,228), timber (£1,920,987), hides and skins (£1,378,747), meat (£2,272,247), fresh fruit (£1,922,627), and butter (£70,813).

Education. Free education is available. Primary education is compulsory. Technical schools are estab. in the prin. centres. The univ. of W. A. in Perth (also free) provides courses for degrees in arts, science (including agriculture), engineering, etc.

Communications and Population. There are 4348 m. of main railroads, owned and worked by the W. A. Gov. There are also 277 m. owned by the Midland Railway of W. A., and 450 m. of Commonwealth line. There are 2 Commonwealth Gov. interstate airlines from Perth to other state caps., and 2 main companies maintain air communication within W. A. There is a high-power Commonwealth Gov. wireless station at Applecross, between Perth and Fremantle. There are also lower-power stations at Esperance, Geraldton, Broome, and Wyndham. The chief port is Fremantle, which is the first and last port of call in Australia for all mail and other liners using the Suez route, and for many on the Cape route. The chief tn is Perth, which had a census pop. in 1955, within the 10 m. radius area of the metropolitan dist., of 359,000, which total includes the Fremantle suburbs, the pop. of which was 32,061. The ports, besides Fremantle, are Albany (8265), Bunbury (9870), Geraldton (8308), and Broome (1264).

The chief centre of the agric. dists. is Northam (5725), of the goldfields areas, Kalgoorlie-Boulder (22,834), and of the coal mines, Collie (8668).

Constitution and Government. Responsible gov. was granted to W. A. in 1890. The legislature consists of 2 Houses: the Legislative Council, with 30 members, and the Legislative Assembly, with 50 members. Both Houses are elective. Women are not disqualified by reason of sex either for election or as voters.

Early History. Probably the earliest exploration was that which is recorded in the words cut into the tin plate now in

the State Museum at Amsterdam, which was nailed on 25 Oct. 1616 by Dirk Hartog, the commander of the Dutch vessel *Eendragt*, to a post erected on Point Inscription on what is now Dirk Hartog Is. The first Englishman to land on these coasts was Wm Dampier, who, in 1688, in the *Cygnet*, landed at King Sound. Fr. navigators followed during the next cent., notably d'Entrecasteaux in *La Recherche* in 1792, de Freycinet in 1818, and de Bougainville in 1825. In 1791 Vancouver, in the *Discovery*, took formal possession of the country above King George Sound; in 1801 Matthew Flinders in the *Investigator* explored the S. coast, which, at his suggestion, subsequently received the name of Australia; whilst between 1818 and 1822 Philip Parker King charted the N. coast. In 1826 the gov. of New S. Wales sent some convicts and a detachment of soldiers to King George Sound and formed a settlement then called Fredericks Town. In 1827 Capt. James (later Sir James) Stirling surveyed the coast from the Sound to Swan R. and in 1829 Capt. (later Sir Charles) Fremantle in H.M.S. *Challenger* took possession of the ter., and founded the Swan Is. Settlement, which is now the state of W. A., and the tns of Perth and Fremantle. Capt. Stirling was the first lieutenant-governor.

Aborigines. The aboriginal pop. was estimated in 1954 to be 14,500 (excluding half-castes), some 8500 of whom are in touch with civilisation, and the remainder in those parts of the state as yet uninhabited by the white man. The aborigines are still assisting to no small extent in the development of the N. portion of the state, chiefly as stock boys, shepherds, station hands, domestic servants, etc. Generally speaking, the aborigines are not hostile, though at times they are troublesome owing to their proneness to cattle-killing. The policy of the Aborigines Dept is in the direction of inducing the natives to support themselves by their own labours, and this policy is worked through a number of native stations and settlements set up in the N. and S.

See H. Taunton, *Australia*, 1903; J. S. Battye, *Western Australia: A History from its Discovery to the Inauguration of the Commonwealth*, 1924; H. P. Colebatch, *A Story of One Hundred Years: Western Australia, 1829-1929*, 1929; Sir J. W. Kirwan, *An Empty Land: Pioneering in Australia*, 1934; P. Hasluck, *Black Australians: A Survey of Native Policy in Western Australia, 1829-97*, 1943; *Pocket Year Book of Western Australia* (ann.).

Western Breed, see SHEEP.

Western Desert, administrative div. of Egypt comprising the Egyptian portion of the Libyan desert. The area was first called W. D. during the First World War, to distinguish it from the E. (Sinai) Desert. During the Second World War the term was sometimes extended to cover the desert in Libya.

Western Front in Second World War. For events leading up to the outbreak of

war in 1939 and the opening up of a W. F., see EUROPE (*History*) and WORLD WAR, SECOND.

A. CAMPAIGNS OF 1939-40.

September 1939-April 1940. There was no serious fighting on the W. F. before May 1940. When the Second World War started the urgent problem of the W. Allies was to render effective aid to Poland. Direct aid was possible only by attempting the hazardous task of forcing a military expedition through the Baltic. Indirect aid could only be really effective if adequate forces were deployed on the W. F. to compel the Germans to divert a substantial part of their E. armies to the defence of the Rhineland. With a half-hearted France relying passively on the Maginot Line (q.v.) and a few Brit. divisions with no armour, a frontal assault on the W. Wall (q.v.) or Siegfried Line was out of the question. At the start of the war, however, the Fr. armies under Gen. Gamelin advanced with cautious deliberation against the Siegfried Line; by 5 Sept. they were along the frontier between the Rhine and Moselle, and finally they occupied an area of about 250 sq. m. within the Ger. frontier. There was strong Ger. resistance by 12 Sept. and counter-attacks began 3 days later, when the Germans were free to switch all their forces from Poland to the W. By the end of Oct. the Fr. armies had fallen back on their own frontier and operations were reduced to a few raids and artillery duels, with patrol activity. During this time Brit. troops were crossing the Channel and by 11 Oct. about 160,000 men had reached France. Early in Dec. Brit. troops were in occupation of a portion of the Maginot Line in contact with the Germans, who, however, far from contemplating any direct assault, were making strenuous preparations to deliver a flank attack through the Low Countries. There was no intensive activity in the air in this early period of war on the W. F. There was no bombing of back areas or communications. Troop movements on both sides took place without interference from the air. There were only reconnaissance flights and 'leaflet raids' by the R.A.F. over Germany.

Invasion of the Low Countries, 1940. At 3 a.m. on 10 May Ger. land and air forces launched an attack on the Netherlands, Belgium, and Luxembourg, and simultaneously carried out extensive bombing raids at many places in the Low Countries and also on a number of tns in France. In the meantime, fierce resistance was offered by Dutch and Belgian troops and immediate appeals for help were made to Britain and France. In Luxembourg, a large part of which was immediately overrun by the enemy, the Grand Duchess and the gov. left the country and reached N. France.

The Ger. assault was accompanied by heavy air attacks on the main aerodromes in Holland and Belgium and the movement of masses of mechanised troops across the frontiers. The Dutch resisted

Belgium, however, the Belgian army continued to hold the 'demolition line,' considerably in advance of the first defence line, and there was heavy fighting on the Albert Canal, on the Meuse, and in the Ardennes.

British and French Advance through Belgium. On the succeeding day, fighting on the whole W. F. from Holland to N. France was very fierce, the Brit. and Fr. march through Belgium continuing with great speed. Intense Ger. air activity, however, continued on a large scale over the Low Countries and N. France, hundreds of planes being in action. Despite the flooding of low land by the Dutch, the enemy crossed the Meuse in the prov. of Limburg and penetrated into Belgium, thrusting across the Albert Canal towards Hasselt. The success of this decisive manoeuvre was due to an overwhelming air superiority. The activities of spies or 'fifth columnists' (see FIFTH COLUMN), the masses of tanks, the thrust of heavily armed motor cyclists racing far ahead of the tanks into the Belgian and Dutch cities, the merciless bombing of open cities and towns, and the hampering of the movements of the troops by masses of terrified and panic-stricken civilians, inevitably spelled ultimate disaster. But it is conceivable that if certain bridges over the Meuse had been destroyed the German advance might have been halted and perhaps eventually the lines might have become stabilised as in the First World War. On 13 May the Ger. forces in Holland broke through the first line of defence on the IJssel and made a bold thrust along the Maas and the Waal, with the obvious intention of driving a wedge between Belgium and Holland. Here again an important factor in the Ger. success was the omission to blow up a bridge near Arnhem, an omission due to fifth-column activities, as indeed it was in most of the notorious cases on the W. F. where bridges were left intact; over these the Ger. tanks, armoured cars, and cyclists passed at will. On this day, 13 May, the Germans employed about 1000 heavy tanks in Belgium, the centre of their attack being the Ardennes area, where immense armoured forces and bombing planes made a combined effort to force the way through to the Meuse and towards Longwy and Montmédy. On the succeeding day (14 May) the Germans had reached the Meuse from Liège to Sedan and the battle raged from the Moselle to Longwy.

Allied Evacuation of Sedan. Sedan was evacuated in the evening of 14 May. The Germans, by the power of their mechanised forces, broke through the vitally important Belgian defences at the angle of the Meuse and the Albert Canal, their object being to overwhelm Belgian resistance before liaison could be established with the Fr. and Brit. Forces. Meanwhile the R.A.F. continued incessant day and night attacks on Ger. strategic points and columns, often against vastly superior numbers. In Holland on the 13th the position for the Dutch had suddenly become desperate owing to the Germans

crossing the Moerdijk bridge which brought their forces in rear of the flood defences and linked up with their troops at Rotterdam. This city was the scene of ceaseless air attacks.

On 15 May the Brit. Expeditionary Force in Belgium was heavily attacked on its entire front, fighting being especially severe around Louvain. Farther S. the enemy drove a salient into the Fr. lines, though their advance was hampered by air attack from the Fr. and Brit. aircraft. In Holland the Dutch continued to hold out in the is. of Zeeland, but the Germans now entered the remainder of Rotterdam, Amsterdam, and The Hague and, indeed, were in full possession of the country. The Dutch Army was ordered to lay down its arms. Fighting in Belgium continued with unabated violence, the Belgian army retreating in good order in the N. and central parts of the country. On the Meuse the battle also continued, and, in the S., the French withdrew to their main defensive positions (a continuation of the Maginot Line), leaving Sedan uncovered. At Liège the forts were still holding out, though isolated, and the enemy penetrated beyond the city. On 14 May von Rundstedt's armoured columns crossed the Meuse between Sedan and Namur, breaking the hinge of the Allied advance into Belgium. The tanks drove on westward, whilst behind them the gap was widened. The Brit. and Fr. forces were thus compelled to retreat, and abandon Brussels and Antwerp: the movement began on the night of the 16/17th. On 17 May the Germans entered Brussels, Louvain, and Malines, the Allies establishing themselves E. of the cap. in good defensive positions. The Belgian Gov. moved to Ostend. The Germans entered Antwerp on 18 May but the Brit.-Belgian line remained intact and repulsed all attacks. On the next day Weygand succeeded Gamelin as commander-in-chief of the Allied forces. At the same time some 15 Fr. gens. were relieved of their commands. By these changes it was hoped to retrieve the desperate situation, but the will to fight of the troops was more important, and this seemed to be disappearing. (See FRANCE, *History*.)

German Advance on the Channel Ports. On 19 May the main Ger. drive from the Meuse, having pierced the Fr. line between Valenciennes and Sedan, turned westward towards the Channel ports, both Le Cateau and St Quentin falling into their hands after stubborn resistance.

On 20 May the drive was vigorously continued, and on that day Laon fell and the Germans advanced S. to the historic Chemin-des-Dames. They then reached Abbeville, Amiens, and Arras on the following day; but in Belgium the Brit. and Fr. forces still held the line of the Scheldt and threw back the enemy both there and S. of the Scarpe. The situation was still more ominous on the morrow when the Ger. motorised forces advanced farther towards the Channel N. of the Somme in the direction of St Pol and Montreuil-sur-Mer. But there were fierce

counter-attacks between Arras and Douai by the Brit. troops and heavy fighting between Cambrai and Valenciennes. The Germans now held an immense bridgehead over the Somme, and the B.E.F. the Fr. First Army and other units, and the Belgians were cut off, though their S. flank was reasonably solid along the canals between Escaut and La Bassée, and to St Omer along the R. Aa. The main communications were cut and only N. Channel ports available. The B.E.F. and the Fr. First Army began to withdraw to the R. Lys, and whilst this movement was in progress another calamity befell them. On 28 May King Leopold of the Belgians capitulated to the enemy.

Evacuation of B.E.F. at Dunkirk. As late as 27 May the Brit. front remained intact, and at Aire, on the Lys, the B.E.F. counter-attacked successfully with the co-operation of Fr. tanks. But the surrender of Belgium created a situation of extreme gravity for the isolated Brit. and Fr. forces in Flanders, now surrounded on all sides by the enemy's armoured forces and subjected to continual intense air bombardment, with only one small corridor to the sea at Dunkirk remaining. At Boulogne the R.N. evacuated a brigade of Guards on 23-24 May. A few days earlier a brigade drawn from the Rifle Brigade, the 60th Rifles, the Queen Victoria Rifles, and the Royal Tank Regt. was sent from England to hold Calais, with an equal number of Fr. troops, and to maintain communications with the B.E.F. Finding it impossible in face of strong enemy mechanised forces to carry out the latter task, it concentrated on the defence of Calais and, in spite of repeated attacks of 2 armoured divs. and continuous air and artillery bombardment held out until 27 May, losing most of its personnel (only 30 survivors of a total force of 4000 were brought off by the Navy), but by its epic heroism it gave the greatest assistance to the main body of the B.E.F. in its withdrawal on Dunkirk (q.v.). Time gained enabled the Gravelines waterlines to be flooded and to be held by the Fr. troops. Thus it was that the port of Dunkirk was kept open. The Ger. High Command now declared that 'the fate of the Fr. armies in Artois was sealed', and that 'the Brit. army was threatened with annihilation.' This was true. But the B.E.F. were resisting fiercely and were inflicting enormous losses on the enemy. Meanwhile Prioux's Fr. forces were desperately striving to cut their way through at Cassel, 20 m. S. of Dunkirk and at Kemmel, to the SW. of Ypres, and there was more desperate fighting on the banks of the Yser. On 29 May the Brit. were occupying a narrow tongue of land extending from a point W. of Dunkirk, through Bailleul to Armentières and thence back towards Ypres and Dixmude. But their operations were impeded by the thousands of refugees caught between the fire of the opposing forces, and heavy pressure from opposite quarters compelled the British still further to shorten their line. The following day the Brit. and Fr. forces

in the N. continued to fall back on the coast in face of some 40 Ger. divs. With the Allied forces in desperate straits and packed into a small bridgehead, the Ger. armoured forces were forbidden to attack. This order, which was received with astonishment by the local commanders, emanated directly from Hitler and has never been satisfactorily explained. It certainly made the task of evacuation possible, but the troops still had to endure artillery bombardment and air attack upon the beaches and the rescuing craft. The tenacity of the men of the B.E.F. and the firmness of the rearguards never wavered, and over the next few days was enacted one of the greatest feats of rescue in the hist. of war. The troops, Brit., French, and Belgian, were being embarked in full view of the enemy, and from the open beaches, with the men often wading up to their necks to reach the boats. But c. 337,000 men (War Office records, 336,427; Admiralty, 338,226) were taken off and reached England by 4 June by a relay fleet of small ships. The work of the R.A.F. and the Fr. Navy at this time was outstanding. Elements of Prioux's army fought their way to the coast. Thus was palliated one of the greatest military disasters in Brit. hist., in which the Brit. army had lost all its guns and transport, and all the armoured vehicles that were with the army in the N. Not all the Brit. troops were evacuated from Dunkirk: large numbers moved across France to Normandy and Brittany to be evacuated from there. At this date the Fr. army had been gravely weakened, the Belgian army had been lost, a large part of the fortified lines upon which so much faith had been reposed was gone, many valuable dists. and factories had passed into the possession of the Germans, the whole of the Channel ports were now in their hands, and a mortal blow, either at Britain or at France, was to be expected at any moment.

The Battle of France. The Fr. armies, demoralised, now faced their enemy alone. The fighting around Dunkirk gave some respite to the French in the S., and Weygand created a defensive system in depth, though of an elementary nature, on the Aisne and the Somme, where, however, the Ger. bridgehead already existed. Early on 5 June the Germans delivered a new offensive along the whole of this improvised Fr. front from the Channel to the Laon-Soissons road, the attack being violently pressed against the left wing of the French on the Somme and, the following day, this so-called battle of France was waged with unabated violence between the sea and the Chemin-des-Dames, the Germans throwing in masses of tanks in groups of 200 or more at numerous points. On 7 June the Germans were making a particularly heavy thrust on the lower Somme near Abbeville, S. of Amiens in the Oise valley, and in the direction of Rheims. The next day they launched a violent attack between Amale, near the source of the R. Bresle, and Noyon, 27 m. S. of Péronne. In face of 7 armoured divs. and 20 fresh infantry

divs., the Fr. line withdrew between the Somme and the Channel. On the same day a group of Ger. tanks penetrated to the Dieppe-Paris road at Forges-les-Eaux, 40 m. SW. of Abbeville.

On the sixth day of this great battle Italy declared war on Britain and France. Already the enemy was almost at the gates of Paris, and on 10 June Reynaud appealed to Roosevelt for material aid and said that France would continue to fight, if necessary from N. Africa. But he reckoned without the disintegrating forces within France itself. On 9 June Ger. armoured units in the region of Forges-les-Eaux and Argeuil, on the left of the Fr. line, were advancing towards Rouen and Gisors; but between Montdidier and Noyon, at Soissons and in the Champagne, their advance seemed temporarily checked. The next day some Ger. units had crossed the Lower Seine, while furious fighting was in progress E. of the Aisne as far as the Argonne. At Réthel, NE. of Rheims, 11 June, they suffered very heavy casualties, but farther W. their advance guards had penetrated to within 20 m. NE. of Meaux, while a thrust NW. of Paris towards Pontoise brought the enemy within striking distance of the Fr. cap. The Fr. Gov. depts now left Paris for Tours, and the Ger. approach also led to a vast exodus of civilians. The enemy, now in Rouen, was increasing his attacks from that city to Vernon in order to extend the bridgeheads estab. S. of the Oise; while near Château Thierry he was already securing a foothold S. of the Marne. The estab. of these bridgeheads over the Seine and Marne now disclosed the menace of the huge pincer movement on Paris which was closing in on the city from NE. and NW.; while W. of the city the Germans were attacking with fresh forces S. of Rouen and towards Evreux. Ger. advanced units were moving on Le Havre by 13 June. On that day, the bulk of the 51st Highland Div., which had been in action in Normandy, was surrounded by superior forces and obliged to surrender, attempts at evacuation being only partially successful owing to fog. The 1st Canadian Div. and the 52nd Lowland Div., sent from England early in June, were withdrawn by the 17th, only the 157th Brigade of the 52nd having gone into action. The embarkation of other Brit. troops proceeded: in all, 136,000 Brit. and 20,000 Poles were evacuated from Fr. ports. On 14 June the enemy entered Paris. Meanwhile, the battle of France continued along the whole front. Le Havre fell; Verdun was stormed; and Montmédy, the cornerstone of the Maginot Line, was taken. The entire Fr. line was crumbling. The Fr. armies S. of Paris were still retreating, and in Alsace-Lorraine the Germans broke through the Maginot Line at Saarbrücken. The citadel of Verdun was captured. The fact that some 200,000 Fr. prisoners had been taken between 5 June and 15 June gives an indication of the rapidity and weight of the Ger. offensive and of the poor morale of much of the Fr. Army. The French Gov. then

left Tours for Bordeaux (15 June), where it resigned and was replaced by a new gov. under Marshal Pétain, whose function was simply to ask Hitler for an armistice, leaving Britain alone to defend the world cause. In an eleventh-hour hope of restoring Fr. morale, the Brit. Gov. offered to conclude a solemn Act of Union between the 2 countries, involving a single war cabinet and common citizenship. The proposal was rejected.

Franco-German Armistice. Meanwhile de Gaulle (q.v.), *chef du cabinet militaire* under Reynaud, who was now in London, withstood the attitude of the Pétain Gov. From London he made an appeal to all Fr. officers, soldiers, engineers, and skilled workers in Britain to get into touch with him.

His difficulties, however, were very great, for Fr. morale had so deteriorated that most of the nation followed the lead of Marshal Pétain. By 18-19 June the Germans were pushing forward towards Nantes and Lyons, besides having captured Strassburg, Lunéville, Toul, and Nancy. This marked the end of organised fighting and on 20 June Pétain broadcast a message telling the world that he had asked the enemy to put an end to hostilities. On 21 June the enemy took the naval base at Brest and had reached the Lower Loire between Nantes and Tours. Hitler handed the armistice terms to the Fr. plenipotentiaries in the forest of Compiègne on 21 June and, pending communication with the Bordeaux Gov., hostilities continued on the Western Front, chiefly in the region of Thionville and Colmar—where it was very bitter—and in the Vosges. On the next day there were only local engagements S. of the Loire, while in the N. the Germans took St. Malo and Lorient in Brittany. At this moment it. troops were attacking the French at various points between Mt Blanc and the Mediterranean with little success. But this desultory fighting marked the close of hostilities on the W. F., for on the same day the Fr. Gov. accepted the Ger. terms. Churchill immediately took speedy action to prevent Hitler from capturing the Fr. Navy, and so saved Britain (*see NAVAL OPERATIONS*). On the same day de Gaulle announced the formation of a Fr. National Committee in London which would carry on the war at the side of the Brit. Army until final victory.

B. CAMPAIGNS OF 1944-5.

I. INVASION OF NORMANDY. *Plans and Preparations.* Informal discussions for the cross-Channel invasion of Ger.-occupied Europe began as early as 1942, and at the Casablanca conference of Jan. 1943 it was decided to evolve outline tactical plans. Such a plan, to be known as 'Operation Overlord,' was approved at the Quebec conference in Aug. At the beginning of 1944 Gen. Eisenhower (q.v.), appointed supreme commander of the Allied Expeditionary Force, left the Mediterranean for England. Both he and Gen. Montgomery, who was to command

the land forces, agreed that the initial assaulting force should be increased to 5 divs. from the 3 originally planned. Two follow-up divs. and 3 airborne divs. were also used. The initial objectives were to be Caen, Bayeux, Isigny, and Carentan, and the port of Cherbourg, then the Breton ports southwards to Nantes; after this was to come a drive eastward on the line of the Loire towards Paris and N. across the Seine area with the object of destroying as many enemy forces in this area as possible

said that if a defensive success were to be obtained it would require the breaking-up of the invasion on the beaches.

Allied Landings in Normandy. The invasion began at 2 a.m. on 6 June (known as 'D-Day'), with mass airborne parachute landings behind the Ger. lines; 2 Amer. divs. then landed at the base of the Cotentin Peninsula, and 2 Brit. and 1 Canadian farther F. to hold the left flank on the R. Orne. An immense force of 4000 ships, with sev. thousand smaller craft, crossed the Eng. Channel



Imperial War Museum. Crown Copyright

'D'-DAY. MEN OF THE 13/18TH HUSSARS ASSEMBLING ON 'WHITE' BEACH

Medical personnel are attending to casualties, landing craft are seen in the background

A very great deal would depend on the enemy's rate of concentration. Efforts to delay this included air attacks on his troops and communications, the threat of other landings, particularly in the Pas de Calais, and the aid of the Fr. Forces of the Interior. All these measures proved highly effective. Moreover, overwhelming air supremacy was obtained.

On the Ger. side F. M. von Rundstedt was Commander-in-Chief West, and F. M. Rommel commanded the N. and larger army group. By June von Rundstedt had 60 divs. in France, Belgium, and Holland, 10 being armoured or motorised. In the immediate area of the Allied landing there were 9 infantry and 1 panzer divs. Rommel had been urging on the strengthening of the coastal defences; he

with the land forces and their equipment. More than 640 naval guns from 16 in. to 4-in. bombarded the beaches and enemy strongpoints in support of the invading armies. The landings were, after heavy fighting and some anxious moments, successfully effected on the 5 sectors as planned. the Americans of Bradley's First Army on the 2 westerly, and the Brit. of Dempsey's Second Army with the Canadian First Army on the 3 easterly beaches, all under Montgomery. By 11 June a beachhead 50 m. wide and 10-15 m. deep had been gained, so that further landings of troops with every kind of necessary equipment could be carried out on a large scale. For the greatest amphibious operation in world hist., the combined losses of the Brit. and Amer.

fleets were remarkably small. On 8 June Bayeux fell to the allies in fierce armoured and infantry battles. Contact was now estab. between the seaborne and airborne troops. Tanks were landed both by ship and by big transport gliders, and a tank battle was soon in progress near Caen. Beach landings continued on the ensuing days. On 8 June 1000 Flying Fortresses and Liberators attacked bridges and railway junctions and airfields within an arc 100-150 m. around the beachhead, while medium and light bombers kept up the assault on railway targets nearer the troops. The Allies now thrust forward from Bayeux SW. towards St Lô, while von Rundstedt counter-attacked in the Caen area. Montgomery advanced in the Caen area so as to engage in a bitter, tense holding struggle while Amer. troops under Bradley crossed the Carentan-Valognes road and cut the railway to Cherbourg. Montgomery's tactics were to lead von Rundstedt to believe that his main attack would be directed towards Paris, while, at the same time, by holding the enemy at Caen, he enabled the Americans to advance up and across the Cotentin or Cherbourg Peninsula. Thus at this early stage in the battle of Normandy the Germans were forced to make a complete change of front from a line parallel to the coast to one running straight across from sea to sea. At the same time this involved a lengthening of their front.

Capture of Cherbourg. On 11 June the Americans reached the outskirts of the town of Montebourg 16 m. S. of Cherbourg. On the 12th Amer. troops by-passed Montebourg and passed on to Valognes and Cherbourg. Two days later W. of Caen Brit. forces fought their way to Caumont and Villers-Bocage. On the 16th the threat to Cherbourg grew with the capture of St Sauveur. By reaching the W. coast on 17 June, the Americans isolated the Ger. troops to the N. as well as Cherbourg. On 22 June an all-out attack was launched by the Americans after an intense artillery and air bombardment. To the E. the Brit. and Canadian forces, by pinning down 4 panzer divisions, made it impossible for the enemy to undertake any effective counter-attack in relief of forces in the Peninsula. The joint Ger. commanders gave themselves up on 26 June and all resistance in this N. sector had ended by 1 July.

The Battle for Caen. Capture of La Haye du Puits. With Cherbourg in the hands of the Allies, the centre of gravity shifted to SW. of Caen, where Montgomery's forces were pressing on against bitter resistance. Here the Germans had not yet made a major counter-attack but were bringing up first-class reinforcements. Previously, on 25 June, Montgomery's forces had begun an attack E. of Tilly-sur-Seuilles. Brit. forces crossed the Odon on the 28th. The battle for Caen was now joined. The British held firm on the Odon salient against repeated counter-attacks, and it was obvious that hard fighting remained before the enemy hold

on Caen, with its network of communications, could be broken. At the beginning of July the initiative was indubitably with Gen. Montgomery. Except for a little ter. W. of Villers-Bocage and near Troarn, his forces held all their gains since the landings, besides establishing a broadening salient directed at Caen from the SW. To have reached this position in 3 weeks from the initial landings was an astonishing achievement. On 3 July, the Americans started an offensive in the direction of La Haye du Puits, the opening attack being delivered in driving rain on a 20-m. front. In the Second Army area the Canadians battled towards Caen from the W. and there was a 3-day struggle for the Carpiquet airfield (4-6 July). On 8 July Montgomery launched a massive attack upon Caen preceded by a heavy aerial bombardment. The Germans, with their supplies cut off, broke, and the tn N. and W. of the Orne was occupied.

The Battle of the Rivers (Odon and Orne). Americans take St Lô. Though Caen was in Brit. hands, the enemy remained firmly in possession of the Faubourg de Vaucelles across the riv. Moreover, the difficult Bocage country and high ground overlooking the vils. of the Odon and Orne would only yield to a kind of crowbar process of attrition. The Second Army, however, exploited its victory at Caen, for on the morning of 10 July fresh infantry and armour struck through the bridgehead estab. over the Odon by the 15th Scottish Div. and headed SE. for the Orne. The impetus of the Brit. movement across the Odon carried them to high ground above Maltot and Esquay in the direction of the Orne. The enemy reaction was vigorous, and once more he was forced to use the armoured units which he had been trying to withdraw to form a strong striking force. On the night of 15 July the Brit. Second Army made a double thrust between the rivs. towards Noyers astride the main road to Villers-Bocage and against the tn of Evrecy. Meanwhile the Germans were fighting fanatically to retain the heights surrounding St Lô, but the Americans were gradually closing in round the tn. By 16 July none of the main roads out of the tn was of much use to the enemy as a traffic artery, for the Americans were astride most of them. But the Germans still held high ground N. and S. of the Periers-St Lô road, and from these dominating heights poured down harassing artillery and mortar fire, the heaviest barrage theretofore experienced by the Americans. On the next day the Americans reached the outskirts of St Lô, and on 18 July they took the tn.

The Allies were now ready for the breakthrough, disposing of 30 divs. The Germans had lost 160,000 men and 30 per cent of their tanks, and few reinforcements were available.

British Second Army Reach Cagny. The operations in the Evrecy-Esquay area deceived the enemy, and the drive to the S. and SE. of Caen achieved complete tactical surprise. Following a fierce air

assault, the Brit. Second and Canadian First Armies struck across the riv. By 18 July Vimont was reached by the Guards' Armoured Div., Bourguébus by 11th Armoured Div., and a point S. of Dénouville by 7th Armoured Div. The enemy's resistance then began to stiffen, and he counter-attacked S. of Bourguébus with 50 tanks. By nightfall a strong anti-tank screen was estab. which halted the Allied advance, on the line Emiéville-Cagny-Soliers. Then the weather broke, and the battle area became a sea of mud, which checked further tank operations.

Anglo-Canadian Offensive S. of Caen. Americans take Avranches. A new attack was launched S. of Caen on 25 July by Montgomery's 21st Army Group. An area to the W. of St Lô was blasted by 4700 tons of bombs on the morning of 25 July, and the Amer. advance on a 3-div. front began, whilst S. of Caen the Canadians advanced astride the Falaise road. The Americans entered Coutances on 28 July. The Canadians came up against a strong defensive belt which they began to probe, with heavy air support. After the fall of Coutances the Amer. attack gathered speed. The Sienne R. was crossed on 29 July, and on the 31st Avranches and Granville were taken. No effective barrier remained between the Americans and Brittany, and an open flank had been created.

American Blitzkrieg through Brittany. Gen. Dempsey Takes Villers-Bocage. On 1 Aug. the Americans crossed the Sélune R. and began their sweeping invasion of Brittany. Armoured forces, in 3 powerful thrusts, struck far ahead of their main forces. One thrust reached Rennes on 2 Aug., while others drove northward, taking Dinan and isolating St Malo and Combourg. While the Brit. Second Army gathered against itself most of Rommel's first-class armour, Bradley's forces were driving swiftly into the peninsula of Brittany. The whole manoeuvre was brilliantly co-ordinated, and the immediate result was that in a few days the Ger. line in Normandy had gone and a new extraordinarily confusing type of fluid warfare began to develop, the Allies holding the initiative. The Brit. thrust S. of Caumont made good progress. To the NE. Villers-Bocage fell on 5 Aug., and to the SW. of Caen, Evrecy and Esquay on the 4th. The flank of the Amer. salient was thus protected. Ger. resistance stiffened with the arrival of reinforcements. The Americans continued their spectacular advance against negligible opposition into Brittany; for their tanks, sweeping 60 m. S. from Rennes in a few hrs, reached the Loire and cut off the whole of Brittany. Other U.S. armoured forces, in an 80-m. drive to the W., reached Brest; while the other 3 great ports of Brittany—Lorient, St Nazaire, and St Malo—were completely isolated.

German Counter-attack towards Avranches. With the Brest peninsula sealed off by the Amer. advance to the Loire, the main Allied weight began to turn eastward. In quick succession the Amer.

Third Army took Mayenne and Laval (6 Aug.), Château-Gontier, and Châteaubriant, and then pressed on towards Le Mans on the highway to Paris. Simultaneously the Brit. Second Army advanced through Unay-sur-Ordon to Thury Harcourt on the r. b. of the Orne. With the capture of Mont Pinçon in the Bocage country by the Second Army on 7 Aug., the Allies now commanded nearly all the wooded ridge from the Orne to St Martin-des-Besaces and the S. slopes which fall away towards Condé-sur-Noireau. Very soon the Canadian First Army had driven a wedge 5 m. into the Ger. lines and an armour and infantry battle was being fought between Caen and Falaise. Meanwhile the Ger. command made a strong counter-attack at Mortain to the E. of Avranches, hoping to find the Allied line weak at the junction of the Brit. and Amer. forces, and to sever the communications of the Third Army. But Bradley had prepared to meet the expected attack, and R.A.F. rocket-firing Typhoons gave the greatest assistance in destroying the Ger. armour. Not until 12 Aug., however, did signs of a contemplated Ger. withdrawal become apparent, and once again the enemy held too long to a position from which he would have been wiser to retreat. By that date the decision had been taken to seize the opportunity given by the enemy tactics, and encircle him, Montgomery having apparently taken the initiative in this decision. The Caen sector still remained the most sensitive part of the N. front. On the line of the Laison R. the Germans held the Canadians for sev. days. Following a heavy air attack this line cracked on 14 Aug. and on the 17th Falaise was at last occupied. Without the heavy, persistent, and bloody battles fought for Caen and for Falaise the rapid advances made elsewhere would have been impossible.

From Paris to the mouth of the Seine every bridge had been destroyed by the Allies excepting those at Le Manoir and Oisseil above Rouen. The bridges in Paris itself were still intact. But these latter alone were inadequate as a means of escape for a large army with heavy equipment. It was into this trap that von Kluge's Ger. Seventh Army was gradually falling. The Amer. sweep into Anjou and Maine had turned the enemy's front and compelled him to extend it; and now the bulk of Third Army was moved eastward to carry out the encircling operation. The sudden double threat to Falaise from the Brit.-Canadian forces and to Alençon and Argentan from the Americans brought home to von Kluge the danger to his whole Seventh Army. He began to retreat on 11 and 12 Aug., moving perforce for the first time in daylight, and suffering devastating blows from the Allied air forces.

The Falaise 'Pocket' and the Caen 'Hinge.' The Ger. situation was precarious. On the night of 12 Aug. Amer. units had reached Argentan and the Fr. 2nd Armoured Div., Écouche. The vital importance to the Germans of holding on at all costs at Falaise became obvious, for

the mobile Allied right had already swept right round his main body and had come within 20 m. of making contact with the almost stationary left. A large part of 8 panzer divs. escaped, but lost much of their equipment; 7 infantry divs., part of an eighth, and some panzer units were trapped. The orderly progress of the Ger. retreat collapsed on 17 Aug., when Falaise was occupied, and chaos ensued, intensified by Allied air attacks on the shrinking corridor. The gap was sealed at Chambois, on 20 Aug., and the pocket was eliminated on the 22nd. The remnants of the Seventh and Fifth Panzer armies fled headlong to the Seine, and there was no possibility of a further stand W. of that riv.

Meanwhile Patton with 12th and 20th Corps began an eastward dash in a wider encircling movement towards Paris and the Seine. On 17 Aug. Chartres and Dreux were entered. Mantes, Gassicourt was reached by 15th Corps 2 days later, and thus the roads from Normandy to Paris were cut. Ferries alone remained as a way across the Seine for the retreating Germans. Meanwhile, to the S., 12th Corps reached Orleans on 17 Aug., and patrols of 20th Corps entered Fontainebleau on 20 Aug. The tanks then swept around the SE. of Paris of Melun, other units crossed the Loire and Yonne rvs., and on 25 Aug. 12th Corps was 40 m. E. of Troyes. After the elimination of the Falaise pocket, Brit. and Canadian troops, advancing eastwards, soon reached Deauville, Lisieux, and Orbec. By 30 Aug. no Germans remained W. of the Seine except those shut up in Brittany.

The End of the Battle of Normandy. By a skilful use of pontoons and ferries the Germans managed to bring 27,000 troops back across the Seine, but the losses inflicted on them were enormous, the concentrations of vehicles and tanks forming an ideal target for the air forces.

Since the beginning of the campaign the equivalent of 5 panzer divs. had been destroyed and 6 severely mauled. The equivalent of 20 infantry divs. had been wiped out and 12 more badly cut up. Two infantry divs. and a parachute div. were locked up in Brittany and another infantry div. cut off in the Channel Is. By 25 Aug. 400,000 casualties had been inflicted; these included 200,000 prisoners, of whom 135,000 had been taken after the break-out of 25 July. 1500 guns, 500 assault guns, 20,000 vehicles, and 1300 tanks had been destroyed or captured, and heavy losses inflicted on the Luftwaffe.

II. THE LIBERATION OF FRANCE AND THE LOW COUNTRIES.

Allies Cross the Seine. Flying-bomb Sues. While the remnants of the Ger. Seventh Army were retreating to the Seine, Allied troops were securing crossings of that riv. between Paris and the sea. Sev. Allied forces were now threatening the Ger. line of the Somme, where it was expected that the enemy might try to make a stand to defend the Pas-de-Calais

coast. This was of especial importance to the enemy on account of the propaganda value of the 'V1' pilotless or flying bombs (q.v.), which for many weeks had been fired over London, and also, of the rocket bombs ('V2', see ROCKETS), which it was believed the Germans were preparing to launch. S. of Paris Amer. forces advanced rapidly, and without meeting much resistance, to the Marne. Soon they were in possession of Meaux, Epernay, Château Thierry, and Soissons. Brit. tanks, with following infantry, moved forward in the whole area between the Seine and Marne. Brit. tanks had split the Ger. Fifteenth Army, now committed to action for the first time, and the enemy, threatened by Canadian and Brit. forces, which had estab. bridgeheads at Elbœuf and Louviers as well as Vernon, left Rouen. The Brit. Second Army made the passage of the Seine on 26-27 Aug. Two crossings were developed very well and quickly at Louviers and Vernon, and on 27-28 Aug. these bridgeheads were expanded, and an advance started on 29 Aug. The first objective was Amiens, a great communication centre, the capture of which would trap many Germans between the Somme and the sea.

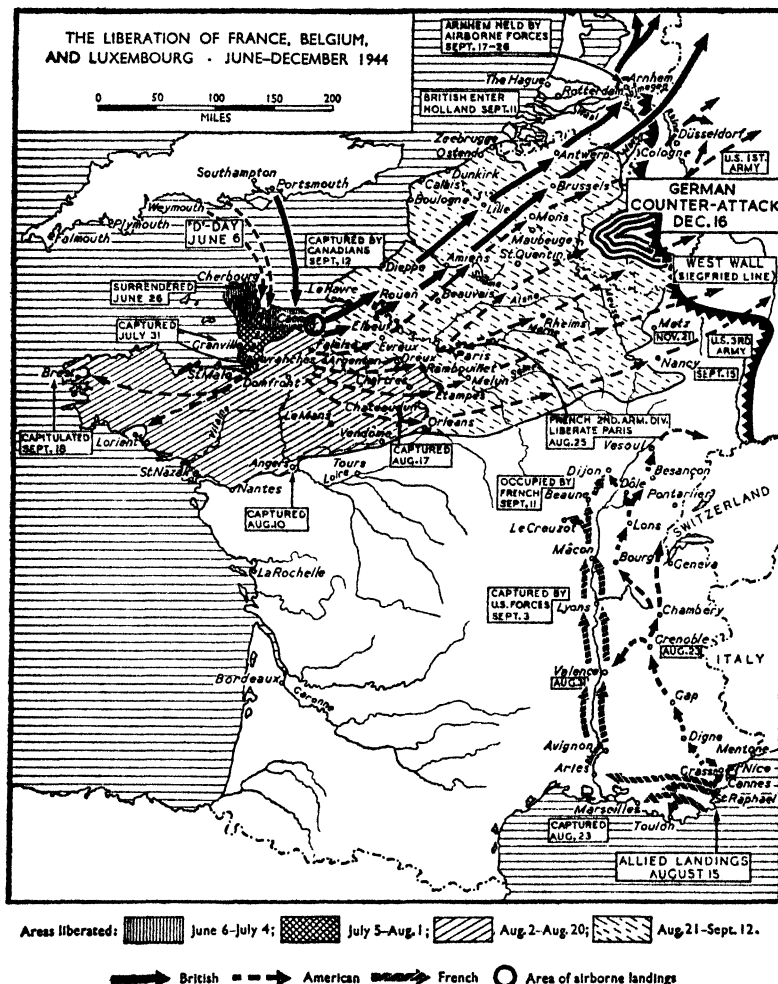
Allied Landing in Southern France. The outer flank of the Amer. sweep was protected by keeping the rest of the Ger. forces in France occupied, by the Allied landing on the Riviera, and by the operations of the Fr. Forces of the Interior under the general command of Koenig. It was planned that the landing forces should march swiftly northward and eventually make contact with Gen. Patton's Third Army advancing towards the Meuse. Amer., Brit., and Fr. forces under the general command of Gen. Maitland Wilson landed in the S. of France on 15 Aug., between Nice and Marseilles. The Is. of Port Cros and Levant in the Bay of Hyères, and Cap Nègre on the mainland were soon taken by Amer. and Fr. troops. Airborne troops, dropped in considerable numbers behind the enemy coastal defences, accounted in part for the light opposition encountered. Only 8 days after landing, forces of the Amer. Seventh Army reached Grenoble—a 150-m. advance rendered possible by the activities of Fr. 'maquis' in opening the road to their Allies. By 24 Aug. 17,000 prisoners had been taken, the port of Marseilles was occupied by Fr. troops of the F.F.I., and enemy forces in Toulon were being fiercely assailed by the maquis. Hyères, a Ger. strongpoint, also fell on the same day as Marseilles. The advance of the Seventh Army N. along the Rhône valley was maintained against desperate resistance, mainly by 4th Panzer Div. Other Amer. units passed through Nice and headed for the It. frontier. On 31 Aug. the Americans occupied Valence, while to the SW. the French entered Montpellier, Béziers, and Narbonne.

The Fall of Paris. After a 4-day battle in which 50,000 members of the F.F.I. under Koenig, supported by sev. hundred thousand unarmed patriots,

fought the Germans in the cap., the enemy were driven out of most of the chief buildings. On 24 Aug. troops of the Fr. Second Armoured Div. under Leclerc forced their way into Paris, and the next day the Germans officially surrendered.

seized Amiens on 31 Aug., and estab. a 12-m. bridgehead on the N. bank of the Somme. The Canadians swept along the coast, and Dieppe fell on 1 Sept.

Eisenhower moved his H.Q. to France on 1 Sept., and took direct command of



Allied Troops Cross the Aisne, Oise, Somme, and Meuse. The Ger. front in N. France had now completely broken, and the battle of France had turned into a rout. The Amer. 7th Corps crossed the Aisne on 29 Aug. Armoured columns of Gen. Dempsey's Brit. Second Army

all land forces. F.M. Montgomery continued in command of 21 (or Northern) Army Group. Gen. Bradley commanded 12 (or Central) Army Group, comprising the First Army under Gen. Hodges, the Third under Gen. Patton, and the Ninth under Gen. Simpson. On 15 Sept., the

forces from the S. became Sixth (or Southern) Army Group under Lt.-Gen. Devers, comprising Gen. de Lattre de Tassigny's First Fr. Army, and Gen. Patch's Seventh Army. Along the whole front from the Pas de Calais to the Argonne the Allied armies drove on towards Belgium, Luxembourg, and Germany, overrunning such historic places as Arras, Vimy Ridge, Laon, Rheims, and Verdun almost without a fight. The British swept into the Pas de Calais to wipe out a number of the original flying-bomb sites. While Brit. troops were still (1 Sept.) fighting in the vicinity of Le Havre, where the Germans had strong positions, F.F.I. entered Arras and fought the Germans there before the arrival of the Brit. troops, which latter then pressed on to Lens, while other Brit. forces were close to Abbeville.

Allies Advance through Belgium and North-Eastern France. Americans on the Moselle. Lyons Taken. On the left was Crerar's First Canadian Army advancing through Abbeville and towards Dunkirk, next, Dempsey's Army advancing to Lille and Brussels, then the Amer. Armies under Hodges and Patton advancing on Namur and the Moselle respectively. Dempsey's armoured columns, in a remarkable advance, reached Brussels on 3 Sept., having covered 45 m. in 1 day. Namur fell on 4 Sept., while Patton's patrols were in the vicinity of Nancy and Metz. Antwerp was taken by Brit. troops on 4 Sept., and this meant that the Pas de Calais was isolated and the last chance which the remaining Ger. troops there had of escaping had gone. Canadian forces were closing in on Boulogne, Calais, and Dunkirk, where Ger. garrisons of some few thousands still remained. With the fall of Namur on the Meuse, the Amer. First Army and the Brit. Second Army were now linked in a double offensive. Amer. and Fr. forces entered Lyons on 3 Sept., and by that date the Germans had retreated from virtually all S. France, from Lyons westward to the Atlantic. Ger. hopes of making a stand in the Rhône valley at Lyons were dispelled after troops of the Amer. Seventh Army had crossed the Rhône and its trib. the Ain some 20 m. E. of the city. On 6 Sept. the British reached Ghent. At Louvain most of the bridges across the Dyle were, with the assistance of Belgian resistance forces, captured intact. Sedan was soon enveloped in the Amer. onward surge. First Army units crossed the Meuse on 4-5 Sept. near Dinant and advanced down both banks of the riv. to Liège. The Allied armies in France and Belgium were now massing for a series of assaults on a front of more than 200 m. from the Albert Canal in the N. to Metz in the S. Still farther S. the forces of Gen. Patch were in the vicinity of Maçon and Besançon. Patrols of the Seventh and First Amer. armies were now in touch with each other (11 Sept.). This contact realised a continuous Allied line from the Low Countries to the Riviera.

Allies Reach the Siegfried Line. Continuing the advance through Belgium, the

Canadians occupied Ostend and Nieuwpoort, Hodges's Amer. troops took Liège, and Dempsey's troops crossed the Albert Canal. On the Moselle Patton's troops won sev. bridgeheads. Resistance stiffened as the Allied forces approached Germany, and it was no longer possible to make the swift advances which had brought about the fall of Antwerp. Fr. and Amer. forces took Besançon, on the Rhône-Rhine Canal. Hodges's American's liberated the city of Luxembourg on 10 Sept., and in the Aachen area the Siegfried Line came within range of their artillery. The Brit. bridgehead on the Albert Canal, estab. by attacking N.E. from Louvain on 7 Sept., was consolidated. Zeebrugge fell to the Canadians on 10 Sept. On the next day Hodges's troops crossed the Ger. frontier N. of Trier, and in the Aachen area E. of Eupen on the 12th. Bruges, Spa, Malmédy, and Bourg Leopold fell to various Allied forces, and the Ger. garrison at Le Havre, numbering 7000, surrendered to the Canadians on 12 Sept. S. of the Scheldt estuary other Canadians were meeting increased resistance on the Leopold Canal. Infantry of Patton's Army entered Nancy and captured Epinal on the 15th, while Hodges's infantry and tanks broke into the Siegfried Line N. of Aachen, meeting little resistance, but the line of defence extended backwards in considerable depth. Much stiffer resistance was encountered whenever the Allies threatened an advance on the lower course of the Rhine, for that way lay the road into the heart of Germany. Also, on the 15th, Maastricht was liberated by Americans and Dutch patriots. On 23 Sept. Boulogne finally fell to the Czech Brigade under Canadian command; Calais was taken on the 30th by the Canadian 2nd Corps.

III. CAMPAIGNS IN HOLLAND. BATTLES OF ARNHEM AND AACHEN.

Airborne Troops Land in Holland. German Resistance at Nijmegen and Arnhem. Metz Encircled. A new turn was given to the campaign in Holland on the afternoon of 17 Sept., when strong forces of the First Allied Airborne Army landed in the Rhine delta as part of an attempt to strike at the N. flank of the Ger. defence line in the W. This was the greatest airborne operation so far launched in the war, more than 1000 aircraft taking part. R.A.F. and Amer. bombers prepared the way with massive assaults on airfields and gun positions. Next day more airborne troops and supplies were poured into Holland, and by the 19th advanced armoured patrols of the Brit. Second Army estab. contact with all the airborne forces except those N. of the Lower Rhine in the Arnhem area. On 17 Sept. the Guards' Armoured Div. had pushed N. against heavy resistance which delayed its advance into Rindhoven, captured by the 101st U.S. Airborne Div. Contact was made on the 18th, and the Guards made swift progress to Grave, captured by the 82nd U.S. Airborne Div., which also held the area to

Nijmegen, but the Germans held the town and the vital bridge across the Waal. Near Arnhem, the other main landing area, the Germans launched their most powerful counter-attacks, comparable with those in the fighting for Caen. Along the line of Dempsey's advance the Brit. tanks encountered Ger. 88-mm. anti-tank guns and Panther tanks estab. in concrete emplacements, and groups of Brit. tanks had to turn off from the columns to reduce these strongholds while the main body swept ahead.

It was also evident that around and beyond Aachen, the Germans were preparing to make a most powerful stand. There was house-to-house fighting in the factory area of Stolberg. NE. of Nancy, Patton's troops were engaged in a violent tank battle, while in the battle for Metz his infantry were fighting hard to gain the dominating NW. heights and so complete the encirclement of the city.

The Battle of Arnhem. The crisis in the important battle of Arnhem for the Brit. airborne troops W. of the town was now obvious, for Brit. tanks driving N. from the bridgehead at Nijmegen to relieve them were delayed by counter-attacks against the bridgehead. The airborne troops at Arnhem had now been holding out for 6 days against heavy and continuous attacks from all sides; but so long as there was a prospect of relief, the situation, though critical, was not hopeless. Polish airborne reinforcements had joined the Arnhem men. Other reinforcements were moving along the 40-m. corridor to strengthen Dempsey's troops; but the road from Nijmegen northward to Arnhem was a hard one for the Brit. ground troops and Amer. airborne forces who were fighting their way forward against very powerful Ger. infantry and anti-tank opposition. But the position of the Arnhem men was steadily deteriorating. On 25-26 Sept. those troops of the 1st and 6th Airborne Div. who could be withdrawn were brought back across the Lower Rhine. 2163 men of the 1st Airborne Div. were withdrawn, but 7000 killed, wounded, and missing were lost. Their stand at Arnhem, however, was not entirely fruitless. Apart from inflicting casualties twice as great as their own, the div. achieved a second aim; for at Nijmegen the Ger. forces on the spot were overwhelmed by Brit. ground armoured forces and by Amer. airborne men dropped to the S. of the bridge over the Waal, which was thus secured and put behind the advancing Brit. Second Army. This was so far the most important tactical success that the Germans had gained in the W. since the opening of the Allied invasion.

Allied strategy had now to be re-adapted to the closing of what had looked for a time like a short cut to victory against the Rhenish defences. Positive advantages had, nevertheless, been won. The widening of the corridor, in conjunction with other northward attacks estab. a firm line eventually running along the Waal and Maas. A similar extension on the E. brought 21 Army Group in line

with 12 Army Group and within striking range of Kleve. Firm bridgeheads across the Waal and Maas had been estab., and the watershed between these 2 rivers later became a valuable line of approach to the Rhine.

Fall of Brest. Brest (q.v.), in Brittany, which had been closely besieged for more than 6 weeks, at last fell to the Americans. Some 36,000 Ger. prisoners were cut off in the port and captured.

Battle of Aachen. Canadians Cross the Leopold Canal. There followed a period of more static warfare, with stiffening Ger. resistance. The main centres of attack were between Nancy and Metz, in the Aachen area, and in the Scheldt estuary. At Metz and along the Moselle, tenacious resistance was maintained. But farther N. the Americans had liberated all but a small portion of the Grand Duchy of Luxembourg. Between Aachen and Gellenkirchen the Amer. First Army on 2 Oct. drove a wedge 2 m. deep through the Siegfried Line. By capturing Ubach, S. of Gellenkirchen, they made a definite break through the Line and were now in more open country E. of those defences. But one of the most urgent objectives of the Allies was to dispose of the Ger. defences on the Scheldt estuary; for so long as these were intact the great port of Antwerp was useless to them. I.A.F. bombers therefore began operations by breaching the dyke at Walcheren so as to flood the is. Three days later the Canadian First Army began a general assault towards the S. bank of the Scheldt, establishing a bridgehead over the Leopold Canal. Later, Canadian and Brit. troops landed from the Scheldt behind the Ger. positions in the bridgehead on the S. bank of the river, thereby easing the pressure on the Canadian forces. By 10 Oct. the Canadian and Brit. troops who had landed behind the Germans had joined hands, and the combined bridgehead was 2 m. deep and 3 m. wide; while the bridgehead over the Leopold Canal was consolidated, a considerable success achieved in spite of 30 Ger. counter-attacks in 4 days. Meanwhile the great struggle for Aachen was reaching its climax, for the city was almost completely encircled following Hodge's successful assault on Crucifix Hill, an 800-ft high feature 4 m. NE. of Aachen. The city was first entered on 13 Oct. and the final surrender of the garrison took place on 21 Oct.

Conquest of Walcheren and Scheldt Estuary. Antwerp Port Cleared. The chief task of the Brit. forces was now to clear the Scheldt estuary in order to render Antwerp practicable as a port for direct supply to the Allies. Hence efforts were made by the Brit. and Canadian armies to isolate large forces of the enemy in W. Holland, and, while the Canadian First Army were fighting to clear the estuary and hold the Beveland peninsula, Dempsey's forces delivered 2 converging blows in the general direction of 's Hertogenbosch, an important junction on the railway running from the N. to Tilburg and Bergen-op-Zoom and then to Flush-

ing. On 22 Oct. the Canadians captured the port of Breskens and also Eschen, on the Belgian-Dutch frontier, N. of Antwerp. The struggle for s'Hertogenbosch was protracted and bitter, but on 24 Oct. Dempsey launched his fourth attack, as a result of which Brit. troops fought their way into the tn. Meanwhile the Canadians succeeded in sealing off the S. Beveland causeway where it joins the Dutch mainland. On 25 Oct. Canadian forces captured Fort Frederik Hendrik, the key to the Ger. positions on the S. bank of the Scheldt, and the Ger. forces holding what was the Breskens 'pocket' fell back on their last line of defence in front of the Belgian seaside resorts of Knocke and Heyst. On 29 Oct. the important tn of Breda was captured by Polish troops attached to the Canadian First Army, and the whole Allied line in SW. Holland was advancing swiftly forward to the Maas. The operations to clear the Scheldt undertaken by the Canadian Army were planned to culminate in an attack on Walcheren Is., the most heavily defended area of the approaches to Antwerp. The attacks were to be made simultaneously across the S. Beveland causeway, across the Scheldt from Breskens to Flushing, while a landing was also to be made at Westkapelle mounted from Ostend. By breaching the dyke, heavy bombers of the R.A.F. had previously flooded a large area of the is.; this had resulted in preventing the mutual support of sections of the invading garrisons though enabling the assault troops to make full use of amphibious vehicles. In view of the vital need to clear the Scheldt as soon as possible the Canadian First Army commander decided to launch the Breskens-Flushing attack on 1 Nov., by which time Allied troops would be on the S. Beveland causeway, whether or not the Westkapelle attack, which would be more dependent on weather, could go on. Hence at dawn on 1 Nov. Brit. commandos and Foot Guards landed on the SW. coast of Walcheren, while Canadians fought their way along the causeway from S. Beveland to gain a footing on Walcheren. Canadian troops also attacked the Knocke-Heyst 'pocket' and stormed their way into Knocke. The Brit. assault troops landed at two places on Walcheren; at Westkapelle they took the vital dyke on which were mounted most of the Ger. heavy naval guns which had for so long been denying the Allies the use of the port of Antwerp, while another series of landings made head-on against Flushing resulted in the greater part of the tn being in Brit. hands by nightfall. Much assistance was given the assault troops by the rocket-firing Brit. Tynphoons. Meanwhile N.E. of s'Hertogenbosch (Bois-le-Duc), the Brit. had reached the Maas and were converging on the Ger. escape bridge at Geertruidenburg. On 3 Nov. Flushing was entirely in Brit. hands, and other forces were advancing on Middelburg. To the N., Royal Marines captured Domburg. Heavy fighting was, however, still in progress on the causeway from

Beveland. But Ger. resistance on the mainland S. of Walcheren ended with the surrender of Zeebrugge, Knocke, and Heyst, and with these places taken, all Belgium was liberated.

Little resistance was left on Walcheren by 7 Nov. Middelburg had now fallen, 2000 prisoners being taken there. The crowning achievement was the opening of Antwerp to the flow of supplies, for now the enemy had been removed from both banks of the Scheldt estuary, and as the swift descent of the 11th Brit. Armoured Div. much earlier had forced the Germans to leave the dock area intact, the port came into operation with little delay, in spite of flying-bomb and rocket attacks. With the capture of Vrouwenpolder in the N. of Walcheren the enemy's long resistance to the Allied advance westward was at length overcome. Eastward, on the Hollandsche Diep, only a few rear-guards were left to fight on the Moerdijk road and railway bridges.

As a result of the month's campaigning which began on 6 Oct. 2 Ger. divs. were destroyed and 2 others most severely handled. The Ger. Fifteenth Army had suffered another crippling blow, within a few weeks of its heavy losses during the Allied pursuit across N. France. Allied casualties in these operations were not far short of 40,000 in all.

IV. ALLIED ADVANCE ON THE RHINE AND SAAR.

The Allied plan now envisaged an advance by the N. and Central groups of armies to the Rhine, for it was necessary to hold the l. b. of the riv. from its mouth at least up to Düsseldorf before striking across it into Germany.

Americans Beleaguer and Capture Metz. The Amer. Third Army launched a new attack on 8 Nov., N.E. of Nancy. Despite rain and mud, the Americans estab. 2 more crossings of the Moselle N. of Metz. On 10 Nov., the Third Army was advancing all along its front to the N.E. of Nancy. Château Salins, which had been enveloped on both sides, fell on the night of 9 Nov. Even more important strategically was the capture of a 1200-ft.-high ridge, the Côte de Delme, 7 m. NW. of Château Salins. Ger. resistance was scattered and variable—stronger to the N. around beleaguered Metz and weaker to the S. SE. of Metz the Germans were now withdrawing at sev. points, but to the N. of the great fortress in their resistance grew still stiffer, and in one counter-attack they made a salient 1½ m. deep in the Amer. bridgehead across the riv. Violent Ger. counter-attacks were launched against the flanks of the Amer. Third Army's offensive in the Moselle valley, but failed to halt Patton's advance, which now threatened to envelop Metz from the SE. Due S., Amer. troops were now less than 6 m. from the city, the prin. key to the route into Germany by the Moselle gap. On the 17th, the Americans were within less than a m. of Metz. The city itself fell on 21-22 Nov., but 7 of the forts held out, and not until 13 Dec. was

the difficult task of reducing them finally accomplished.

German Retreat Ended. Allied Attack on the Roer. The Ger. retreat had almost ended by the end of Nov., and the Germans had fallen back on their home bases, with the advantage of their own elaborate frontier networks of strategic railways and arterial motor roads. They had chosen their fronts, as in E. Europe, with a view to the greatest possible economy in manpower. The 'West Wall' (Siegfried Line) was not a line of great forts of the Maginot type; rather was it a fortified zone, incorporating the natural defensive features of the mts from Hürtgen Forest to the Rhine corridor; and on this whole front of 250 m. there were only 2 weak spots—that of the Saar coal-basin, into which Patton was now advancing, and the Rhine corridor (the real entrance to central Germany), where it runs northward from Baden and Strasbourg, to Karlsruhe and Neustadt. Von Rundstedt, now in chief command, had reinforced his vital Aachen sector, concentrating against the Allies a dozen first-class divs., of which half were panzer or panzer grenadier, with a group of fresh panzer divs. in hand for counter-attack.

Under a tremendous barrage from 400 guns the Brit. Second Army launched a new attack on 15 Nov., W. of the Maas on the E. flank of the Dutch salient 15 m. SE. of Eindhoven in the direction of Roermond, and they were soon across the Noorder and Wessem canals. A new Amer. army, the Ninth under Simpson, had joined the Allied offensive, and the whole W. F. was now on the move. The Amer. Army of Hodges also joined in the attack E. of Aachen. In a brilliant combined action by Brit. and Amer. forces the important tn of Gellenkirchen, with its network of road communications, was captured on 19 Nov. Meanwhile the Fr. First Army was at the gates of Belfort in the S., and entering Alsace. Next day the Fr. Army, thrusting through the famous Belfort gap, had reached the Rhine between Mulhouse and the Swiss frontier. Belfort itself was entered the same day. While grim fighting continued at the N. end of the battlefield, the Germans were now faced with a vast turning movement of their S. flank by the army group under Gen. Devers, Strasbourg being threatened by a swift Fr. advance beyond Sarrebourg astride the historic route through Saverno. This brilliant stroke by Fr. troops under de Latre de Tassigny and the Amer. Seventh Army of Patch, planned with masterly skill to take the utmost advantage of every defensive manoeuvre by the Germans, was executed in appalling conditions of weather and terrain. In the N. at the same time, Amer. First Army troops captured Eschweiler by 21 Nov., while the Ninth Army was within sight of the Roer R. along a large part of their front.

Campaign in Alsace. Fall of Strasbourg. Battles of the Aachen Gap. Forces of Patch's army, including Leclerc's Fr. armoured div. which had fought as the

spearhead of a most remarkable lunge through the Vosges, were fighting in Strasbourg on the night of 23 Nov. Owing to the collapse of the Fifteenth Army in Alsace the Ger. resistance was light. Elsewhere the Allied advance towards the Rhine was implacably maintained. The most decisive battle was that being fought in the Aachen gap along the direct approaches to Cologne and the Ger. Rhine; for it was here, at the core of the Siegfried defences, that Brit. and Amer. forces under Montgomery, Hodges, and Simpson were battling their way slowly forward against the best fighting units of the Ger. *Wehrmacht*, and they were doing so in the most unfavourable weather. Equally hard was the going in the S., where Patton's tanks were now across the Saar and fighting in a country of woods, hills, and abnormally swollen waterways. But by the end of Nov. most of Lorraine was cleared of the enemy, W. of Merzig Amer. tanks and infantry were now fighting on Ger. soil, and elsewhere the Americans were in some of the strongest positions of the Maginot Line. Saarlautern (or Saar-louis), Saarbrücken, and Saareguemines were now all threatened, for Amer. Third Army forces had reached the Saar at sev. points (5 Dec.), and held a 10-m. stretch of the riv., having overcome determined opposition of every kind. But the major battle was still that which was being fought along the direct route to the Ger. Rhine: yet with Patch in Alsace, moving down the W. bank of the riv., and Patton in Lorraine, gradually closing up the Saar frontier, there were other vital approaches that must soon sap von Rundstedt's reserves. Meanwhile the battle of the Roer was being fought on in foul weather and unending mud, with the Germans making redoubled efforts to strengthen their defences on the E. bank of the riv., particularly with formidable minefields and mortar fire, and indeed to launch a very dangerous counter-offensive from Monschau. In a brilliant surprise attack on 3 Dec., the 95th Infantry Div. of Patton's Army pushed through Saarlautern, captured the main bridge intact, and consolidated their hold on the E. bank of the Saar.

The Ardennes Counter-offensive. The campaign on the W. F., judged by the standards of the mobile warfare of the summer, now, however, seemed stationary; although the methodical massing of force opposite the Ger. field fortifications still involved hard fighting. The main battles were brought about by operations to extend the Allied grip on the well-known gateways to the Reich, the gaps of Belfort, the Saar, and Aachen. To deploy the maximum Allied effort in the Aachen sector and to continue the successful progress of the operations in the Saar-Wissembourg area, other parts of the front were lightly held, and, in particular, only 4 divs. held the Eifel sector of 75 m. between Monschau and Trier.

Meanwhile von Rundstedt had refitted 8 panzer divs., received reinforcements from the E. front, and had assembled 2 panzer armies equipped with the new

Tiger and Panther tanks. He had also managed to concentrate a strong air striking force, though he counted on bad weather to reduce air operations to a minimum. His general plan was to break by a blitz offensive the thinly held Amer. front, and drive to the Meuse in the Namur-Liège area, the latter city being a communications centre for Twelfth Army Group. Once this was seized von Rundstedt planned to drive on Antwerp as fast and as strongly as possible. If Antwerp fell the supply position of the Allies would become highly critical and, moreover, the Brit. forces with the Amer. First and Ninth Armies in the N. would be isolated from the Amer. and Fr. forces in the S. The Ger. forces were the Fifth Panzer and Sixth S.S. Panzer Armies (10 divs.), and Seventh Army (14 divs.), under von Rundstedt's personal command. Also, one panzer brigade operated in Amer. equipment to spread confusion. Paratroops were dropped throughout the area, especially at Malmédy, while small units and agents attempted sabotage as far in the rear as Paris. The attack began on 16th Dec., and Eisenhower at once ordered movements of reserves to the flanks of the attack and reserve divs. forward; an important move was that of the 101st Airborne Div. to Bastogne, from S.H.A.E.F. reserve. During the 17th and 18th it became clear that a full-scale attack was in progress. Against it, all Allied attacks elsewhere were halted and every available reserve was collected to strike both flanks of the penetration. It was planned to hold firmly the shoulders of the wedge, especially Bastogne in the S. and Monschau in the N., to prevent advances in the Liège-Namur area or W. of the Meuse, and then to counter-attack with Patton's forces in the Bastogne-Cologne direction, followed up with those of Montgomery. On 19 Dec. the command system was reorganised to place all forces N. of the line Givet-Prüm under Montgomery, and all S. under Bradley. The 4 divs. which received the full force of the attack were by-passed and isolated, but they slowed down the enemy, and the 7th Armoured Div. held St Vith in the critical early days. The 101st Airborne Div., reinforced with armour, held the vital Bastogne road sector, though they were surrounded by superior forces for 5 days. Reserves were assembled in rear areas, and infantry divs. brought across the Channel. During the first week the N. shoulder of the wedge was held, and an Amer. corps assembled for the counter-attack. Six divs. were moved from the S. to the N. of the Moselle, and a corps was estab. in the Brussels area. At Monschau and Echter-nach the flanks were held, but the westward penetration moved on. From 16 to 22 Dec. a thick ground fog deprived the Allies of the invaluable air support and the Germans were able to achieve the maximum surprise. But from the 22nd, paralysing attacks on von Rundstedt's communications were begun, whilst simultaneously the Third Army began to attack north-eastward from the Arlon-Luxem-

bourg area. By 26 Dec. the 4th Armoured Div. of the Third Army had estab. a firm link with the defenders of Bastogne, and checked the Ger. advance on that flank, whilst also attracting strong enemy forces from the N. of the salient. By this date also the Meuse sector had been adequately covered, and the failure of the enemy's main intentions was obvious. By the time von Rundstedt's offensive was stopped, he had breached a gap of 45 m. in the Allied line and penetrated over 60 m. westward to within 4 m. of the Meuse near Celles. On 3 Jan. the First Army attacked from the N. towards Houffalize, through which ran the Ger. supply route. The Brit. 30th Corps conformed on its right. Towards the same point the Third Army, from the S., launched an attack on 9 Jan. By 10 Jan. the 2 attacks were within 10 m. of each other. The Germans had now begun to withdraw from the W. tip of their salient whilst trying to hold the N. and S. flanks. The First and Third Armies estab. firm contact at Houffalize on 16 Jan. and turned eastwards. St Vith fell on 23 Jan., and by the end of the month the Allies were back on their original line with advance forces attacking beyond. The result was that the Allied offensive against Germany was delayed by at least 6 weeks, and, also, the strategic Air Force had had to neglect its targets deeper in Germany for about a month. Though von Rundstedt had conducted his retreat skilfully, his losses were heavy. By the end of the Allied counter-blow, the enemy had lost 220,000 men, including 110,000 prisoners of war; 600 tanks and assault guns, 1620 aircraft, and large numbers of motor transport were also lost.

German Offensive in Alsace. The Battle for Colmar. Meanwhile Alsace presented a picture of confused fighting. The great Haguenau forest, having little in the way of natural defences, was yielded by the Americans, who had taken up better positions S. of Bitche, which had been the scene of bitter fighting. In Colmar the Germans had built up a formidable 'hedgehog' position, but de Tassigny's Fr. Army late in Jan. delivered new attacks N. and S. of the Ger. position. On 25 Jan. von Rundstedt launched his expected offensive in Alsace and, to the W. of Haguenau, crossed the Moder R. and cut the railway through the N. Vosges to Sarreguemines; but his attacks were held. During the same week the British advanced towards the Roer R. from Holland and captured Heinsberg, the biggest tn in the triangle between the Maas and Roer rvs.; while the Amer. Ninth Army on their right took Brachelen. The Germans were now falling back from the Ardennes bulge to the Siegfried defences. Troops of Patton's Third Army had now crossed the Our R. into Germany. The French in Alsace were close to the outskirts of Colmar. At the end of Jan. the Americans were steadily advancing against the 40-m. stretch of the Ger. frontier between Monschau and Echter-nach. Far from developing his vaunted attack in N. Alsace, the enemy was faced

with the Fr. Army's flanking manoeuvres on the Colmar 'pocket'; while Allied forces stood solidly on the line of the Roer with the threat of further incursion across the Ger. frontier by Amer. forces which, in snow and bitter cold, were methodically following up the Ger. retreat from the Ardennes. On 31 Jan. vanguards of the Amer. First Army crossed the Reich frontier and estab. themselves within 2 m. of the Siegfried Line. On 1 Feb. in N. Alsace troops of Patch's Seventh Army crossed the Moder in force and entered Oberhofen, SE. of Haguenau and, on the same day, de Tassigny's army drove through the Ger. corridor N. of Colmar and, at night, his troops and tanks were on the Rhine, NE. of the city. The Fr. Army, together with Amer. forces under de Tassigny, reached the centre of Colmar on 2 Feb. thus sealing the fate of the formations of the Ger. Nineteenth Army remaining in the so-called pocket. To the N. and W. of Mulhouse the Ger. main route of supply and retreat was cut by forces advancing on Neuf Brisach astride the main Colmar road. On 4 Feb. Fr. and Amer. forces met in the centre of the Colmar 'pocket,' cutting the Ger. forces in two, while all the Germans remaining in the Vosges were surrounded. By 9 Feb. the Colmar 'pocket' was eliminated, and organised resistance there was ended. Patton's forces broke clean through the main Siegfried fortifications 44 m. N. of Prüm on 5 Feb. Two days later Amer. troops crossed the border on the Ardennes front at numerous points from near Clervaux to Echternach over the Our R. and were at once up against the Siegfried defences.

Plan of Operations to Reach the Rhine. It was planned that in operations W. of the Rhine the main effort was to be made in the N. sector looking to the seizure of crossings N. of the Ruhr. Three distinct phases were envisaged, viz.: (1) the Canadians and the Amer. Ninth Army were to close up to the Rhine N. of Düsseldorf whilst the Amer. First Army seized the line of the R. Rft W. and NW. of Cologne. The offensive in the Ardennes was to be reduced, the Germans contained, and the breaches in the Siegfried Line developed. (2) Whilst in the N. the Rhine-crossing was prepared and accomplished, the Germans were to be forced back to the riv. N. of its confluence with the Moselle, and when this was done the S. forces were to capture the Saar basin and advance towards the Rhine. (3) Whilst the N. bridgehead was developed and the central group of armies held a defensive position N. of the Moselle, the remaining S. forces were to close up to the Rhine.

Canadian-British Offensive in the Reichswald. The Canadian First Army under Crerar, with large numbers of Brit. troops, launched the offensive between the Maas and the Rhine as planned on 8 Feb. Crerar's army was fighting in most difficult country. Scottish troops entered Klieve on 11 Feb.; but though the Canadians took Millingen on the Rhine, they were much hindered by floods and, by blowing up dykes, the enemy

had increased the riv. floods. Next day Brit. troops took Gennep, an important stronghold, and Crerar's forces were now through the outer Siegfried defences. A day later most of the Reichswald had been cleared. Meanwhile the Amer. First Army, having taken Schmidt, were fighting for the reservoir system and the great Schwammenauel dam; and the Amer. Third Army had crossed the Prüm and fought their way through the Schnee Eifel forest. In the reservoir area the Americans soon cleared all Ger. troops from the l. b. of the Roer, while the Schwammenauel dam was under Allied control, though not intact, by 10 Feb. The Third Army, which was fighting on the banks of the Sure and Our, were faced by swollen and swiftly flowing rivs. Yet the Americans had secured at least 10 crossings on a 24-m. crecent and were estab. on Ger. soil near Echternach. Troops of the Third Army entered Prüm on 12 Feb. The Canadians, in spite of a number of Ger. counter-attacks, made good progress S. of the Reichswald. Brit. troops had completed their task of fighting a way through the Reichswald, and the enemy, consisting of elements of 7 divs., had withdrawn to the next Siegfried belt through Hochwald, while still holding the important positions of Goch and Kalkar in advance of that belt. Scottish troops of the First Canadian Army were battling relentlessly from house to house through Goch. On 19 Feb. the Germans were surrounded. Next day Patton's troops, in a sudden thrust between the Moselle and Saar, captured Sarrebourg and a score of other tns and vils. On 22 Feb. Brit. and Amer. bombers made their biggest bid to wreck the Ger. railway system. This tremendous air onslaught was the prelude to the offensive of the Amer. First and Ninth Armies across the R. Roer, E. of Aachen. The same day (22 Feb.), the Third Army crossed the Saar at sev. points.

On the next afternoon Hodge's First and Simpson's Ninth Armies launched a surprise offensive across the R. Roer E. of Aachen. The following day the 2 Armies broke into the Rhine plain about 18 m. from Cologne. Tanks and guns were moved across the Roer and a bridgehead secured on a 30-m. front. The fall of the bastions of Jülich (24 Feb.), and Düren (25 Feb.), sealed the fate of Cologne, particularly as the overwhelming power of the Brit. and Amer. air forces, in isolating the enemy on the battlefield, prevented him from delivering any determined counter-attacks. On 26 Feb. the First Army was within 12 m. of Cologne, while the Third had advanced up to 7 m. N. of Echternach and repulsed 7 desperate counter-attacks across the Saar. Next day Crerar's Canadians penetrated into the last belt of the Siegfried defences in the Hochwald, which lies between Goch and Xanten; while Amer. troops were advancing on München-Gladbach, and had reached the R. Ert., Cologne was now under fire from Amer. guns, forces of Simpson's army having secured 3 bridgeheads across the Ert., one of them at

Modrath on the main Cologne-Düren road. Approaching behind the main Siegfried fortifications E. of the Saar, Amer. armoured columns of Patton's army entered the outskirts of the ancient city of Trier on 1 Mar. München-Gladbach was captured on 1 Mar. Swiftly on this success the Ninth Army captured Krefeld and Roermond. In addition to these places, the long and bitterly contested strongholds of Venlo fell to them, thus outflanking at last the barrier of the Maas; and farther S., Patton completed the capture of Trier.

Fall of Cologne. In the N. part of the Allied line the fiercest fighting was now in the E. of the Hochwald, where the Germans were striving to cover the Rhine bridges at Wesel, 20 m. NW of Essen. The momentum of the whole campaign was increasing. Amer. armour and infantry were at the very gates of Cologne (4 Mar.). The whole Allied line, now that the Siegfried defences had been largely overcome, was fast closing to the l. b. of the Rhine, and the enemy forces still remaining W. of the riv. were being split and destroyed in detail. Most of the organised Ger. resistance still maintained on the l. b. was now manifestly intended to cover vital crossings to Wesel and Duisburg. Brit. troops in Crerar's command joined up with Ninth Army forces at Geldern, thus carrying a stage farther F.M. Montgomery's plan to crush the Ger. First Parachute Army. Moreover, this junction at Geldern with the British had carried a long way farther the envelopment of the whole of the enemy forces between the Maas and the Rhine. For after the Hochwald had been cleared the Germans were reduced to a bridgehead 20 m. by 10, from a point opposite Duisburg to the W. of Xanten, these being virtually the last Rhine bridges available to the enemy. After the passage of the Ertf Cologne had ceased to have much tactical value for the enemy, for Allied forces now stood along the riv. between Cologne and Düsseldorf and were also threatening the city from NW. and W. Amer. tanks and infantry broke through the outer defence belts into Cologne on 5 Mar. and took 2 suburbs. The city was finally in Allied hands on 7 Mar. As the Allies had desired, von Rundstedt had fought his main battle W. of the riv.

The Remagen Crossing. Rhineland Bombing. A junior Amer. officer, Lieut. Burrows, made a crossing of the Rhine by a bridge at Remagen, on 7 Mar., only 10 min. before the Germans had planned to destroy it. His platoon of infantry maintained its position on the r. b. until units of the 9th Armoured Div. consolidated the position. By 9 Mar. a lodgement area 3 m. deep was held. Enemy reinforcements failed to contain it; as it grew the vital N.-S. autobahn was cut. By 24 Mar., when the main eastward attack in the N. was begun, an area 10 m. deep and 25 m. long was held, with 3 corps within it. Meanwhile, the junction between the Amer. First and Third Armies on the Rhine was firmly estab. by 10 Mar., with the result that some 10

enemy divs. were enveloped. In a savage battle to the N. the British fought their way into Xanten, while the Canadians were driving up to the S. of the city. The Amer. grip was extended on the l. b. of the Rhine below Coblenz. Northward, the notorious salient at Wesel was at length wiped out by the Canadian First and Amer. Ninth Armies. Thus the Allies now stood on the line of the Rhine the whole way from Nijmegen to Coblenz. Throughout these operations the Allies had ceaselessly carried out strategic bombing of Rhineland industrial centres.

German First and Seventh Armies Annihilated in Saar-Moselle-Rhine Salient. The Germans still held a large triangle of ter. between the Saar, Moselle, and Rhine. But Patton's forces were now converging along the N. bank of the Moselle from the direction of Trier and Coblenz respectively, and steadily reducing the gap of escape across the Rhine to the S., while Gen. Patch's forces were preparing to attack the triangle from the S. The Ger. Seventh Army having been scattered by Patton in the Eifel and driven southward into the riv. triangle, the Ger. First Army was now the only stable enemy command left W. of the Rhine. The combined offensive of the Amer. Third and Seventh Armies (phase 3) now grew ever more menacing. Patton's army crossed the Moselle SW. of Coblenz, while the Seventh Army struck frontally at the remaining Siegfried defences between the Saar and Hagenau preparatory to recovering all the places lost in the enemy's recent counter-offensive in the Palatinate. The 4th Armoured Div. now began its advance to threaten the entire Ger. salient (16 Mar.). Another armoured div. was thrown in soon afterwards to exploit the mounting confusion of the enemy. The Third Army now had 4 tank divs. thrusting through the broken ranks of the Ger. Seventh Army; while Patch's army kept the Ger. First Army impotent by battering it back into the Siegfried Line and crowding into the outer defences in a non-stop onslaught. Along the Saar line Patch's forces in a furious attack penetrated the Siegfried's concrete defences and began to outflank Saarbrücken (18 Mar.). Coblenz was carried by storm on 18 Mar., and Amer. tanks entered Bad Kreuznach and Bingen. Saarbrücken and Zweibrücken were taken by Patch on the 20th, while Patton's forces reached Mainz and the ancient city of Worms and passed through the vital centre of Kaiserslautern 12 m. W. of which place the Third and Seventh Amer. Armies had joined hands. The entire Ger. forces in the salient were now demoralised and racing for the Rhine with Amer. tanks hard on them and fighter-bombers attacking them. On 21 Mar. Patton's army entered Ludwigshafen. Patton's aggressive tactics reached their peak on 22 Mar. in a surprise night crossing of the Rhine, the 5th Div. being sent over without any formal preparations and with negligible losses. Thus 2 bridgeheads were already held before the main assault of 21st Army Group was attempted.

All organised resistance W. of the Rhine ended by 25 Mar., and phase (3) of the operations to close the riv. was completed. The operations had gone entirely according to plan, with the additional gains of the rapid seizure of the Cologne area, and the estab. of 2 bridgeheads. The Ger. armies needed to man the last barrier were shattered to the W. of the riv.

V. FINAL ALLIED ADVANCE ACROSS GERMANY.

Preparations. The Allied strength on the W. F. now reached almost 4,000,000 men. The Ger. position was precarious, and their strength inadequate to man the Rhine barrier. The features of the Allied plan were a main attack to the N. of the Ruhr, aided by a strong secondary drive from bridgeheads around Frankfurt towards Kassel, thus enveloping the Ruhr. Three armies were to be used in the main N. assault. The Brit. Second Army was to attack N. of Wesel, capturing the tn to allow the Amer. Ninth to begin bridging there, the 2 forces then expanding the foothold gained. To assist Second Army the 18th Airborne Corps were to be dropped in the key area N. and NW. of Wesel. On the left flank the Canadian Army was to hold the Rhine and the Maas from Emmerich to the sea. The air arm had a most important task, namely to isolate the Ruhr from the rest of Germany, and to deny the use of its resources to the enemy. Their main effort began on 21 Feb. 1945. Ten of the 18 vital bridges and viaducts were destroyed by 14 Mar., and the communications centres of Dortmund and Essen were heavily raided on 11 and 12 Mar.

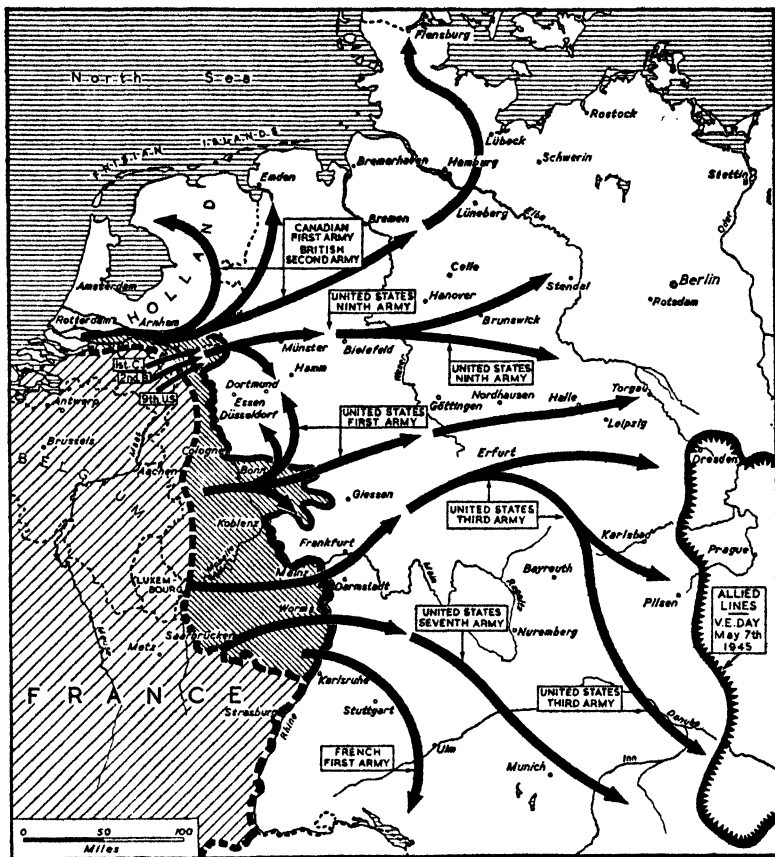
Montgomery Crosses the Rhine. At 8 p.m. on 23 Mar. an artillery barrage lasting an hr opened the offensive. At 9 p.m. the Brit. 1st Commando brigade began the assault on Wesel, and, so accurate and heavy had been the air assault, captured it for 36 casualties. The next night 4 major landings were merged in a solid bridgehead 7 m. deep. 8000 prisoners were taken, and complete contact was soon made with the airborne forces who had landed during the morning. In a day both Dempsey's Second Brit. Army and Smith's Ninth Amer. Army had floating bridges over the wide, swift-flowing Rhine, an outstanding feat of military engineering. Enemy resistance was remarkably light, due largely to the combined weight of air and artillery preparation on a massive scale, and to Allied air supremacy over the battle-area. On the 25th there was stiff fighting near Emmerich, it being the obvious intention of the Germans to hold the front there against a probable Brit. attack northwards into Holland; but NE. of Wesel the British advanced almost unopposed after taking Brünen. There was also very stiff fighting for Rees, but the tn was finally cleared by Scottish troops. Meanwhile the Ninth Army was threatening the whole region S. of the Lippe Canal flowing eastwards from the Rhine near Wesel.

The Amer. First Army had concurrently advanced southwards 35 m. from the Remagen bridgehead, while the Third Army tanks, from new bridgeheads at Boppard and N. of Braubach, had entered the suburbs of Frankfurt-on-Main and penetrated into Bavaria. In the far S. Patch's Seventh Amer. Army crossed the Rhine S. of Worms on 26 Mar. On 1 April the French estab. a foothold across the riv. at Philippsburg, and built up a base from which later to attack SE. towards Stuttgart, and to clear the r. b. up to the Swiss frontier.

Kesselring's Armies in Retreat. Von Rundstedt, having been reinstated to carry out the Ardennes offensive, was again dismissed when the Allies crossed the Rhine, and Kesselring was brought from Italy to face the task of holding the Ger. armies together. As reinforcements of men, guns, and armour flowed across the Rhine, the vanguards of the Brit. and Amer. forces under Montgomery were steadily expanding the Westphalian bridgehead and so putting the crossing sites beyond the range of enemy artillery. It was now evident that the main Ger. defence line had been broken in crossing the Rhine, and in the N. sector of the Allied advance the Ger. front appeared to be collapsing, though Montgomery's major attack was yet to come. The Canadians were steadily moving on towards Emmerich, while the British advanced on Isselburg. Organised Ger. resistance on the centre and S. parts of the front opposite the 21st Army Group had, for the time being, ceased to exist, and the same could be said of the front opposite Gen. Bradley's 12th Group. Realising the peril to the Rhine front, some time previously the Germans started digging intensively on a line running S. from the point where the Ems enters the Dollart, S. of Emden, down to the Dortmund-Ems canal and thence along the line of the Lippe to the Rhine itself and Wesel. But already Brit. and Amer. troops were astride the Lippe, and Ger. power was dwindling so fast that it was difficult to say where forces to man this line were to be found. On the 28th, with the Allied armour driving E. in great strength, the whole of Kesselring's front was now in retreat, in places becoming a rout. As the Ger. columns fled eastward Brit. forces of the 6th Guards Armoured Brigade captured Dorsten 20 m. E. of the Rhine. In the S. Patton's forces, which were now clearing Frankfurt, reached Gemünden in their drive from Aschaffenburg; while Patch had advanced to the Main, E. of Worms. Next day Montgomery's forces were 40 m. beyond the Rhine. On their N. flank the Canadians took Emmerich on 30 Mar.; in the S. forces of the Amer. Ninth Army, advancing 130 m. in 5 days, had captured Paderborn, 60 m. SW. of Hanover and outflanked the Ruhr valley in the S. Patton's tanks, in swift thrusts, were overwhelming the enemy, and at Lauterbach the Americans were only about 200 m. from Berlin. On the same date Patch's infantry occupied Heidelberg.

The Ruhr Encircled. Fall of Münster. By the junction on 1 April of the Amer. First and Ninth Armies near Lippstadt (N.E. of Hamm), the encirclement of the Ruhr was completed. Some 21 divs. were trapped. On the 14th the pocket

Erfurt and Leipzig, to Dresden, cutting in two the remains of the Reich; third, through Nuremberg and Regensburg and via the Danube into Austria. Eisenhower selected the second as the most effective, to be supported by more limited



Approximate areas liberated or occupied to March 1, 1945.

The advance to the Rhine: March 1 to 23.

THE ALLIED ADVANCE INTO GERMANY, 1945

A map showing Russian advances in the East is printed in the article EASTERN FRONT.

was divided at Hagen, and on the 18th it was finally eliminated. Prisoners numbered 325,000, including 30 general officers. The main front was by this date over 100 m. to the E.

Three main avenues for the advance into Germany were available: first, across the N. Ger. plain to the Baltic and Berlin; second from Kassel, through

operations to the N. and S. by Montgomery and Devers respectively. When the central thrust met the advancing Red Army the chief task would be to reach the Baltic and clear the whole N. area, and then to drive down the Danube into the Alpine Redoubt which Hitler intended to garrison with as many of his forces as possible. From Holland to the State of

Baden more than 12 armoured divs. drove deep into Germany. The vanguard of Montgomery's forces were already over 80 m. beyond the Rhine.

Roads from the N. of Holland were seen to be packed with transport of Ger. troops moving out of the country. Münster was entered on 2 April by Brit. and Amer. forces of the 21st Army Group and, at the same time, the Brit. 6th Airborne Div. crossed the Dortmund-Ems Canal and advanced on Osnabrück. Farther W., Rheine, centre of an airfield system, and Enschede, the Dutch border tn, were occupied. Patton's infantry advanced to the outskirts of Kassel.

Allied Advance to the Weser. Hamm Captured. Montgomery made a general advance to the Weser, where the enemy was frenziedly building defensive positions, though his line was already being turned by Amer. armour operating in Thuringia and Bavaria. Columns of Patton's armoured forces entered Gotha on 2 April, after an advance of 20 m. through the N. fringe of the Thuringian Forest. Advancing along the Dutch border to capture Nordhorn, the Canadians crossed the Twente Canal, thus threatening all the Ger. supply lines into Holland. On 3 April, the Brit. 11th Armoured Div. reached the outskirts of Osnabrück. Thus, with Rheine and Münster cleared, the enemy had lost the use of the group of fighter-airfields within the Rheine-Münster-Osnabrück triangle on which the Allied air forces had concentrated so many fierce attacks before the crossing of the Rhine. Twenty m. S. of Münster the tn of Hamm, whose vast railway marshalling yards had been bombed repeatedly for years, was entered by the Amer. 83rd Infantry Div. Forces of the same Amer. Army, the Ninth, also captured the tn of Recklinghausen, and part of the Teutoburger Wald which skirts the railway centre of Bielefeld. On 4 April Montgomery's forces were on the line of the Weser near Minden, on the most direct route to Berlin, though Gen. Patton's columns in Thuringia were still nearer the cap.

Americans take Kassel and Gotha. French Take Karlsruhe. Farther S., Pätz's tanks were less than 40 m. from Nuremberg; while in the extreme S. the Fr. Army in Baden entered Karlsruhe on 4 April. Thus, from Holland to Switzerland, operations were in swift progress to engulf the whole *Wehrmacht* in disaster, though large if isolated pockets of resistance still remained.

Allies Across the Hanoverian Plain. Canadians Advance into Holland. Bremen Captured. Tanks and infantry of the Amer. Ninth Army crossed the Weser S. of Hameln on 6 April. Units of the Brit. 11th Armoured and 6th Airborne Divs. held a long stretch of the W. bank near Minden. The 7th Armoured Div. was approaching Bremen. Canadian armour crossed the Twente Canal and advanced N. of Almelo. More Brit. and Amer. tanks had crossed the Weser in sev. places next day, and the highway to Hanover lay open before them. The

Brit. and Canadian armies under Montgomery were now engaged in a great fanning manoeuvre spreading N.E. across the Hanoverian plain and NW against the enemy's last strongholds in Holland, which latter were now closely threatened by a rapid advance of Canadian armour in the direction of Groningen. Allied parachute troops were dropped over Drenthe and Friesland E. of the Zuider Zee (7 April), while farther S. Zutphen was also captured. By now the city of Hanover was almost enveloped by Allied tanks, while a Brit. column was closing on Bremen. Fifty m. to the S. of Hanover Amer. troops cleared Göttingen. Between Kassel and Mülhausen the enemy made lunges at the Third Army's flank, but without avail and at heavy loss to himself in armour. An advance by 10th Armoured Div. of the Seventh Army, which drove forward SE. of Würzburg, to within 20 m. of Krailsheim on 7 April, had temporarily to be abandoned in face of enemy pressure. There was bitter street fighting in Heilbronn until 12 April, but the area within the great loop of the Main R. near Würzburg was now largely cleared and Amer. tanks were making for Schweinfurt. Forces of the First Fr. Army, advancing on the line of the Neckar, took the important traffic junction of Pforzheim, while other units, advancing on Stuttgart, seized the enemy broadcasting station, which lay outside the city. S. of Bremen the Germans strongly contested the advance of 30th Corps; the outskirts of the city were reached by 22 April, and opposition was finally crushed on 26 April.

Allied Advance on the Elbe. Hanover captured. North-West Holland Isolated. The left thrust of the Allied offensive was now driving across the N. plains of Germany towards the Elbe, the last natural barrier on the road to Berlin, and the 11th Armoured Div. reached it at Lauenberg on 19 April. Farther N. 12th Corps reached the S. bank opposite Hamburg on 20 April. Hanover, vital as a Ger. communications centre, was captured in April by Simpson's army. Amer. armour, advancing S. of the city, on this day cut the motor road to Brunswick at a point about 20 m. from Hanover. Meanwhile Crerar's Canadians had made much progress in isolating the remaining forces in N. Holland, as the result of masterly manoeuvres. Pivoting on Arnhem (not yet taken), a wide wheeling movement had been made to the line of the IJssel, while armoured columns were thrusting due N. to the sea, amidst considerable difficulties in flooded terrain. Bitter resistance was encountered on the approaches to Deventer, which fell on 10 April, and Zwolle. The Germans W. of IJssel were now cut off in a swiftly closing pocket that contained nearly all the prin. cities of Holland.

The Americans Reach the Elbe. Fall of Essen, Schweinfurt, and Coburg. The Ninth Army continued its N.E. advance which it had begun under 21 Army Group after its successful envelopment of the N. Ruhr. Its 19th Corps reached the

Elbe, S. of Magdeburg (70 m. from Berlin), after a more or less unopposed advance of 50 m., on 11 April. The same day the Amer. 17th Airborne Div. attached to the Ninth Army had completed the capture of Essen. Amer. troops of the Seventh Army entered Schweinfurt from 2 directions, but severe fighting followed their entry. Patton's troops, on this date, captured Coburg and entered the outskirts of Erfurt.

Americans Take Weimar. British and Canadians in Arnheim. The 2nd Armoured Div. of the Ninth Army crossed the Elbe early on 12 April. Patton's forces captured Weimar, while one armoured column crossed the Saale 24 m. SW. of Leipzig, by-passing Jena. Scottish troops took Celle on the main Hanover-Bremen railway. Dempsey's troops crossed the Aller SE. of Bremen. In the S. Patch's forces finally cleared Heilbronn after a week-long battle. Brit. and Canadian troops made a new crossing of the hotly contested IJssel and entered Arnheim on 15 April. Brit. troops were now approaching Belsen (q.v.), 10 m. NW. of Celle. Canadian reconnaissance troops reached the N. Sea near the Ems estuary on 15 April and occupied Leeuwarden. The Ger. escape route across the Zuider Zee along the N. causeway was now outflanked. The enemy withdrew behind the Grebbe and New Water lines into 'Fortress Holland,' and no further Allied advance was attempted. The destruction of the Ger. forces still at large was the main concern.

French Combined Operation in the Gironde. A combined assault was launched on 14 April against some 20,000 Germans still entrenched at the mouth of the Gironde covering Bordeaux. More than 2300 Amer. heavy bombers attacked the naval fortifications at Royan and the Pointe de Graves at Le Verdon, while the land attack was opened by Fr. troops under de Laminat. A Fr. naval task force under Adm. Rue bombarded the coastal batteries which commanded the entrance to the estuary. This was the first time since 1940 that the Fr. Navy had put a completely national force into operation. On 15 April troops of Leclerc's armoured div. entered Royan, the strongpoint covering the mouth of the Gironde from the N. Fighting in this sector ceased on 18 April, and on the 21st Pointe de Graves, on the S. bank, was captured. The is. of Oléron fell on 1 May. Farther N. the St Nazaire-Lorient 'fortress' held out until the final Ger. surrender.

Leipzig Taken by the Americans. Czechoslovakia Reached. To the W. and SW. of Leipzig the enemy resisted strongly, although Allied penetrations had been made to the SE. After 2 days of hard fighting the 69th Div. cleared the city on 19 April. The Americans also made an end of the enemy's strenuous resistance in Halle. The 15th Corps reached Nuremberg on 16 April, but the tn held out until the 20th, owing to bitter resistance of the 17th S.S. Panzer Grenadier Div. Allied units closed up

to the R. Mulde. S. of the Harz Mts the First Army offensive, begun on 11 April, progressed with speed against usually limited resistance. Dessau was reached on 14 April, this thrust almost surrounding a pocket of some 10,000 Germans in the mts. Helped by difficult country, they held off the Allies and maintained a corridor to the E. This was cut on 18 April, and organised resistance collapsed 3 days later. A rescue attempt across 50 m. of Allied-held ter. by the von Clausewitz Panzer Div. was frustrated. On the Third Army front, whilst 20th Corps advanced to the N. of Czechoslovakia, 12th and 8th Corps drove towards the SW. frontier, and units entered the country on 18 April. The junction with the Russians which cut Germany in two and achieved the object of the central thrust, was effected on 25 April, when the 273rd Regiment of 69th Div., probing eastward from the R. Mulde, met units of the Russian 58th Guards Div. on the Elbe in the Torgau area.

Troops of de Tassigny's army, E. of the Rhine, almost completely turned the Ger. positions in the Black Forest and advanced to Tübingen, whence a column swiftly raced up the Upper Neckar valley to capture Rottweil near the Danube.

VI. THE LAST PHASE.

The General Situation. The junction of the W. and E. fronts at Torgau split the Ger. forces into 2 unco-ordinated sections, in both of which a weaker resistance became apparent; over 1,000,000 prisoners had been taken by the W. Allies in the first 3 weeks of April, and such losses made collapse inevitable. The administration of the entire country, moreover, was paralysed. The 'National Redoubt' was a major question in the minds of the Allied command. This area, some 240 m. by 80 m. in W. Austria with small parts of Germany and Italy, was extremely mountainous, and though the junction at Torgau prevented the main body of the Ger. Gov. reaching it, there remained the possibility that the more fanatic elements in the S. part might make a last stand there. In the N. part some 50 Ger. divs. remained, the First Parachute Army being the only formidable troops. To prevent a withdrawal into Denmark and Norway, a rapid drive to the Baltic became the primary objective. On the central sector the main Allied forces were halted on the Erzgebirge and the Mulde and Elbe rivs., chiefly because of supply factors.

Whilst the central forces were halted, those to the N. and S. were further to subdivide the enemy and neutralise the possible areas of resistance. Thus 21 Army Group, having crossed the Elbe, was to take Hamburg and advance as fast as possible to the Kiel-Lübeck area, and afterwards liberate Denmark. Meanwhile, the coastal belt was to be cleared. In the S. a similar thrust was to be made down the Danube valley to Linz by the Third Army. In addition, Salzburg was to be taken, and the Seventh Army was

to advance on Munich and penetrate the mts of the fortress area. The Fr. Army was to clear the Black Forest and the Swiss border.

Operations in the North. The British Take Bremen and Hamburg. Conditions in Holland. The Brit. Second Army met steady resistance in its drive towards Bremen and Hamburg. After the fall of the former, on 26 April, the main effort was transferred to the 8th Corps, which crossed the Elbe at Lauenberg on 29 April and rapidly developed a

but without success. Wholesale surrenders took place to the Amer. units halted at the Elbe, whilst the Second Army drove unopposed to the Baltic. The Canadian Army continued mopping-up operations in Groningen prov. and the coastal belt, and Oldenburg fell on 2 May after strong resistance. W. of the IJsselmeer the situation was delicate. The civil pop. was threatened with starvation, the Germans were strongly placed and, moreover, would have opened the dykes and flooded the country if an Allied



Greff

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7 MAY 1945: THE GERMAN SURRENDER AT GENERAL EISENHOWER'S HEAD-QUARTERS IN THE COLLÈGE MODERNE ET TECHNIQUE AT RHEIMS

Facing, left to right: Gen. Sir F. E. Morgan, Gen. Savez, Adm. Sir H. Burrough, Lt.-Gen. W. Bedell Smith, Maj.-Gen. Ivan Suslaparov, Gen. C. Spaatz, Air Marshal Sir J. M. Robb. Facing the Allied officers: Adm. H. von Friedeburg, Gen. A. Jodl, Maj. W. Oxenius.

bridgehead. The Amer. 18th Airborne Corps, fighting as ground troops, crossed to the S., and gave flank protection for further advances. On 1 May, 11th Armoured Div. set out from the bridgehead, moved swiftly across Schleswig-Holstein and entered Lübeck on 2 May, cordoning off the enemy in Denmark. On the same day the Brit. 6th Airborne Div. arrived at Wismar, farther E., and inland Schwerin was taken. Meanwhile other forces moved down the E. bank of the Elbe and occupied Hamburg on 3 May, whilst the region between the Elbe and the Weser was cleared of the enemy. Contact with the Red Army was estab. on 3 May from Wismar to Lake Grabow. By the end of April the enemy abandoned the fight against the W. Allies, and tried to make a last effort to hold the Russians,

assault were made. Seyss-Inquart, the Nazi commissioner, offered a solution by proposing that the Allies should stand on the line of the Grebbe, whilst the Germans allowed relief supplies to be introduced, ceased repressive measures, and made no further flooding. This was accepted and put into operation. Gen. Blaskowitz refused to surrender until the Ger. forces in N. Germany did so.

Operations in the South. The Third Army from 22 April thrust down the Danube valley through crumbling resistance, crossing the riv. on the 25th (leaving Regensburg to be taken on the 26th), and advancing down the r. b. with 20th Corps and the 1. b. with 12th Corps. Passau was reached on 2 May, and 11th Armoured Div. raced ahead to take Linz on 5 May. The Czech frontier was

crossed, and Pilsen fell on 6 May. Amer. forces were halted on the line Budweis-Pilsen-Karlsbad, whilst the Red Army cleared the banks of the Moldau R. and occupied Prague. Contact along the Elbe valley was estab. as agreed.

20th Corps, S. of the Danube, crossed the Isar R. on 29 April, and on 1 May reached the R. Inn at Braunau. To the right, 3rd Corps crossed the Danube near Ingolstadt on 26 April, crossed the Isar on the 28th, and reached the Inn on 2 May.

Nuremberg fell on 25 April, and 2 days later Seventh Army began its last offensive. 15th Corps took Munich on 30 April. Berchtesgaden was occupied on 4 May, other units took Salzburg, and from there to Linz Ger. resistance disintegrated. Meanwhile 21st and 8th Corps crossed the Danube near Dillingen on 22 April, and at Donaauwörth on the 24th. Enemy pockets were cleared, and Augsburg fell on 28 April. To the W., 6th Corps reached Ulm and then drove on to the foothills of the Alps. Innsbruck fell on 3 May, and units pressed on to the Brenner Pass, where, on 4 May, contact was made with units of the Amer. Fifth Army driving into the Alps from Italy. No danger of a last stand in the Redoubt existed. On 5 May, the Ger. Nineteenth Army surrendered, as did the whole of Army Group G the next day.

Operations by the French Army. Simultaneously with Seventh Army's thrust into the Redoubt, the Fr. Army dealt with the Germans farther W. After enemy resistance in the Black Forest area broke, the French moved on swiftly. Lake Constance was reached on 22 April, and the corridor then widened. The advance turned N.E. to Ulm, and on 24 April contact with the Seventh Army was made. Meanwhile the encircling process was completed by another Fr. advance up the E. bank of the Rhine to Basel, and then eastward. Stuttgart had been occupied on 21 April. By the 26th the Swiss border was reached from Basel to Lake Constance, and by the 27th organised resistance ceased despite locally strong opposition. Fr. armour, relieved at Ulm by Seventh Army, now advanced along the N. shore of Lake Constance and on 30 April turned S. into Austria. The advance went on up the Ill and Kloster valleys into the W. end of the Redoubt, where the Seventh Army was met as the Germans capitulated.

By 5 May, the war in Europe was virtually finished, and no Ger. army capable of fighting on existed. Contact with the Red Army was estab. from the Alps to the Baltic, and with the forces in Italy. The Redoubt was occupied, Norway isolated, and the Germans in Holland and Denmark had just surrendered. The Channel Is., the ports of Brittany, and Dunkirk were powerless.

The Surrender. In Mar. 1945 the Nazi Gov. tried, through Stockholm, to arrange a truce with the W. Allies in order to concentrate on the Russians, but immediate rejection was encountered. In the last week of April Himmler offered, through the Swedish Gov., to surrender

all forces fighting on the W. F. Again it was replied that simultaneous and unconditional surrender on both fronts was the only course open. Hitler and his entourage, with nothing to lose, maintained the hopeless fight, but individual commanders began to face the facts. All fighting in Italy ceased on 2 May. Army Group G capitulated on 6 May. The commanders in Norway and Denmark seemed ready to surrender in the last weeks of April, but on 3 May Doenitz, Hitler's successor, who had instructed the forces facing E. to turn around and surrender to the W. Allies, came into the picture. After attempting unsuccessfully to avoid surrendering to the Red Army, his emissaries on 4 May signed a capitulation, effective on 5 May, for all Ger. armed forces in NW. Germany, Holland, Schleswig-Holstein, and Denmark. Adm. von Friedeburg, representing Doenitz, arrived at Eisenhower's H.Q. on the evening of 5 May, and was told that unconditional surrender was the only course open to him. Jodl arrived on 6 May, and it became clear that the Germans were merely playing for time to evacuate as many soldiers and civilians as possible behind the Allied lines, and to cut this short Eisenhower threatened to seal off the W. F. against any westward movement of Germans unless all hostilities on both fronts ceased within 48 hrs. This was immediately effective, and Doenitz approved acceptance of the terms. At 2.41 a.m. on the morning of 7 May Jodl signed the act of surrender on behalf of the Ger. High Command, the terms to become effective at midnight of 8/9 May. Formal ratification was signed in Berlin on the night of 9 May. In these discussions at Allied H.Q. the Russians and the French were associated with the Americans and British.

See Dwight D. Eisenhower, *Report by the Supreme Commander to the Combined Chiefs of Staff on the Operations in Europe of the Allied Expeditionary Force, 6 June, 1944, to 8 May 1945* (H.M.S.O.), 1946, and *Crusade in Europe*, 1948; F.-M. Viscount Montgomery of Alamein, *Normandy to the Baltic*, 1947; and the bibliography to WORLD WAR, SECOND.

Western Islands, see HEBRIDES.

'Western Mail, The,' only morning newspaper pub. in Wales (at Cardiff), founded in 1869, a Kemsley paper, Conservative in politics. Welsh affairs are emphasised in the news services, which include home and foreign affairs. It pub. social, political, and literary articles, covers sporting news, and is notable for commercial and industrial features.

Western Union, name given to an association of the nations of W. Europe for the defence of themselves and their way of life, dating, in its existing form, from May 1955. W. U. has been built on the foundation of a number of specialised institutions set up for limited, clearly defined, and urgent tasks. First of these is the Brussels Pact, a 5-country defensive alliance (see BENEUX; BRUSSELS TREATY). Next is the wider N. Atlantic Pact (see NORTH ATLANTIC TREATY),

which in addition to the Benelux countries includes Britain, France, the U.S.A., Canada, Norway, Denmark, Iceland, Italy, Portugal, Greece, Turkey, and the Federal Ger. Rep. In May 1949 was estab. a European Council with its 2 wings, already noticed, the committee of ministers and the consultative assembly of all-party members of parliaments. This latter is only a consultative body, and is therefore unlike the conferences and meetings of the Inter-Parliamentary Union, an important but unofficial union. It is an official body of members of Parliament meeting with status and functions defined in an international treaty, and is thus part of a great international official machine. On the economic side of the W. U. is the Organisation for European Economic Co-Operation (q.v.) set up in Paris originally for the purpose of distributing Marshall Aid. In Dec. 1949 the W. U. defence organisation that then existed was incorporated with the N. Atlantic Treaty command.

In Aug. 1954 France rejected E.D.C. (the European Defence Community, q.v.). At a conference held in London Sept./Oct. 1954 attended by the original E.D.C. countries and also by Britain, the U.S.A., and Canada, it was agreed to invite W. Germany and Italy to join the Brussels Treaty; to end the occupation of W. Germany and invite her to join N.A.T.O.; and, in addition, arrangements were made for controlling armaments, and Britain guaranteed to keep substantial forces on the Continent for Europe's defence. The machinery for enforcing these agreements was settled by a conference at Paris in Oct. 1954 (see LONDON AND PARIS AGREEMENTS). The W. U. thus estab. was brought formally into being on 7 May 1955.

Westernisers, philosophical and political movement in 19th-cent. Russia which, contrary to Slavophiles (q.v.), held that the historical development of Russia was subject to the same laws as that of Western Europe. Among the leading W. were Belinskiy and Herzen.

Westfalen, see WESTPHALIA.

Westfield: 1. City of Hampden co., SW. Massachusetts, U.S.A., on Westfield R. 7 m. W. of Springfield. It has foundries and lumber mills and produces machinery, bicycles, prefabricated houses, paper products, and tobacco. It has a state teachers' college. W. was settled c. 1660, and incorporated as a city in 1920. Pop. 20,962.

2. Residential tn in Union co., New Jersey, U.S.A., 11 m. SW. of Newark. Its products include crushed stone, cinder, concrete, toys, paint, and dairy products. Pop. 21,240.

Westfield College, women's residential college of London Univ. (q.v.), founded in 1882 by Miss Dudin Brown for the higher education of women. The college is situated near Hampstead Heath; there are about 300 students.

Westhoughton, tn in Lancs, England, situated between Bolton and Wigan, 5 m. from each. The chief industry is cotton manuf. Pop. (estimated) 15,000.

Westland, prov. dist. of S. Is., New Zealand, lying between the S. Alps and the Pacific Ocean, and between Grey R. in the N. and Big Bay in the S. There are gold deposits and coal; sawmilling, dairying, and cattle rearing are carried on. The chief tns are Greymouth and Hokitika. Area 4880 sq. m.; pop. 18,502.

Westmacott, Sir Richard (1775-1856), sculptor, b. London, trained in Rome under Canova. He was elected R.A., 1811, prof. of sculpture, 1827, knighted, 1837. W. was responsible for many of London's sculptural landmarks, including the colossal bronze 'Achilles' in Hyde Park, reliefs on the Marble Arch and the pediment over the Brit. Museum portico. His son, Richard W. (1799-1872), was also a sculptor.

Westmeath, Earl of, see NUGENT, SIR RICHARD.

Westmeath, inland co. of Leinster prov., Rep. of Ireland, bounded N. by Cavan, S. by Offaly, E. by Meath, and W. by Roscommon. The surface is varied and is some 250 ft above sea-level. It contains some very fine scenery and is a co. of loughs, the largest being Lough Ree on the Shannon; others are Loughs Sheelin, Ennel, Derrevaragh, and Owel, all of which are noted brown-trout lakes. The prin. rivs. are the Shannon, the Inny, and the Boyne. The Royal Canal cuts through the co., affording easy communication with Dublin. Agriculture is the staple industry, and dairy farming is largely carried on. Some friezes and coarse woollen materials are manufactured. The chief tns are Athlone and Mullingar, the co. tn. For electoral purposes the constituency is Westmeath-Longford. The co. contains many ant. monuments, and the ruins of Multyfarnham Abbey (1236) with its lofty towers are noteworthy. Area 680 sq. m.; pop. 54,880.

Westminster, Dukes of. The first to hold this title was Hugh Lupus Grosvenor (1825-99), who was created Duke of W. in 1874. He was the grandson of Robert Grosvenor, 2nd Earl Grosvenor (1767-1845), upon whom the title of Marquess of Westminster was bestowed in 1831. The 3rd Duke, William Grosvenor, succeeded his cousin in 1933.

Westminster, City of, pre-eminent among the metropolitan bors. of London because in it are situated the Houses of Parliament, Westminster Abbey, Buckingham Palace, and the chief gov. offices (qq.v.). The fact that it was a royal residence from Edward the Confessor's time, if not earlier, close to the city of London, led to its supplanting Winchester as the legislative capital of the country. It is not clear why the name *Westminster* arose, for there is no clear evidence of any *east* minster so designated in the city of London. The legislative associations began with the setting up of some courts of law and of finance by Norman and Angevin kings in their palace here. The setting up of the Wool Staple in the 14th cent. greatly accelerated the development of W. in the Middle

Ages. After a fire in 1512 W. palace ceased to be a royal residence, and by the end of the 16th cent. the administration of W. had passed to a body of citizens. The city's development was considerable in subsequent cents., but residential expansions resulted in sev. centres each governed by its own vestry, until it was created a metropolitan bor. in 1899. In the same year W. was created a city by royal charter. W. and the city of London jointly return 1 member to Parliament. Area 2503 ac. (including 723 ac. of parks and public gardens); pop. 103,000. See Charles White, *The City of Westminster: official guide*.

Westminster, Palace of, see PARLIAMENT, HOUSES OF; WESTMINSTER HALL.

Westminster, Statute of (1831), Brit. Act of Parliament which estab. the relation of Britain and the dominions as defined at the Imperial Conference in 1926. It repealed certain provisions of the Colonial Laws Validity Act, 1865, thereby abolishing the power of Parliament to legislate for the dominions and to veto dominion Acts; and it acknowledged the right of the dominion parliaments to amend or repeal any Act of the Brit. Parliament applying to them. The S. of W. also recognises the essential link between the members of the commonwealth in the Crown. See also COLONIAL LAW. For earlier S.s of W. see DE DONIS CONDITIONALIBUS; QUIA EMPTORES.

Westminster Abbey. The legendary hist. of the abbey goes back to the foundation of a church by Lucius, the legendary 2nd-cent. 'first Christian king' of Britain, upon the alleged site of a temple of Apollo; to be followed by the building of another church by Sebert, the first Christian king of the East Saxons, consecrated in 616 by the Apostle St Peter, who appeared on earth for the occasion. (The official title of the abbey is The Collegiate Church of St Peter, Westminster.) Authentic hist. begins with a charter (preserved in the chapter house) of Offa of Mercia, who in 785 granted lands and privileges to the church of St Peter at Thorney, but whether this is Sebert's church, if such existed, or a later building, is not known; but certainly there was a Benedictine monastery here in the 8th cent. About 1050 Edward the Confessor began building an immense church on this site, the island of Thorney, which was formed by the effluents of the R. Tyburn where it flowed into the Thames. Fragments of this church, which was consecrated in 1065, are embodied in the present structure. The style was that of the advanced schools of Romanesque architecture which had developed in Normandy and Touraine. For many years Edward the Confessor's church met all requirements, but by the early 13th cent. the old Norman sanctuary had become cramped and inconvenient, and Henry III decided on a new building and a fitting shrine for the canonised Confessor. Demolition began in 1245, and by 1258 the new E. sanctuary was completed. In 1258 the demolition of the Norman nave was begun, and in

1269 the body of St Edward was placed in a splendid gold shrine which stood on the present marble mosaic base. The original design of the E. part was by Master Henry de Reyns, who was succeeded by John of Gloucester, who did little. The third master mason, Robert of Beverley, finished these parts. The nave followed this design in general form, but was changed in much of its detail by that great craftsman Henry Yevele. The nave took over 200 years to complete, nothing being done to it between c. 1269 and c. 1350, being finally completed c. 1528 under Abbot Islip. The W. towers are the work of Wren and Hawksmoor, c. 1722-40.

The building of the last of the great works of W. A., Henry VII's Chapel, which replaced the Lady Chapel of 1220, was begun in 1503. This great artistic achievement was the work of the brothers Robert and Wm Vertue. The fan vault is technically remarkable from the fact that the architects discarded the use of ribs, the unribbed vault being fitted together with as much precision and accuracy as the parts of a mosaic. Everywhere, with the sole exception of the external plinth, the chapel is crowded with ornament.

In 1298 a great fire destroyed all the monastic buildings. The whole of the damage was not made good until the time of Abbot Nicholas Litleyngton (1362-86). The monastery, which had been one of the greater Benedictine houses for over 400 years, was suppressed in 1540, and the abbey raised to the rank of a cathedral. When the only Bishop of Westminster ever appointed resigned in 1550 the see was united to that of London. In 1556 under Mary I it became again a monastery, which was suppressed in 1560 by Elizabeth I, who estab. it as a collegiate church with a dean and chapter, a 'Crown peculiar,' which it has remained ever since.

Design, Architecture, Ornaments. The general plan of Henry III's church is very complex and unsuited for modern congregational worship; but it was designed to meet the diverse needs of the monks, the king and his court whose royal chapel it was, the pilgrims to the altars and shrines, and lay folk at prayers in the nave. The church is very large, long, and high. The extreme length is 530 ft 9 in., breadth 220 ft, length of the nave 154 ft, and its height 105 ft. The height of the towers is 225 ft. The piers are of Purbeck marble. The triforium is one of the most impressive of all the constituent portions of an early Gothic church in England, and the vaulting of the nave is particularly fine. Structurally, Henry III's is a Fr. church, but much of the detail is English.

The royal chapels at the E. end contain several monumental tombs of the highest medieval craftsmanship, especially those of Wm de Valence, Edward III, Eleanor of Castile, Edmund Crouchback, Eleanor de Bohun, Margaret Beaufort, and Henry VII. On the back of the tomb of Philippa of Hainault is the Westminster Retable,

a 13th-cent. oak altar-piece with what is considered to be probably the finest early medieval painting in Europe. W. A. is not only the scene of the coronation of Brit. sovereigns (the Coronation Chair and Stone of Scone are in the Confessor's Chapel), but the great national mausoleum, and many kings, statesmen,



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WESTMINSTER ABBEY

The West Front, showing the 18th-cent. towers.

soldiers, writers, and others are buried or commemorated there. In the centre of the nave is the tomb of an 'Unknown Warrior' of the First World War. Airmen of the Battle of Britain are commemorated by a memorial in the apse bay of Henry VII's Chapel. From a very early date the E. corner of the S. transept has been called Poets' Corner; the earliest represented is Chaucer, and amongst the last is Thomas Hardy.

The chapter house was built 1250-3 and is one of the largest in England. From the reign of Edward I until 1547 parliament generally met here. It was completely restored by Sir Gilbert Scott in 1865, its beauty having been largely impaired by use as a record office. The tile pavement dates back to c. 1250. The mural paintings have been skillfully restored. S. of the chapter house is the chapel of the Pyx, a vaulted chamber

built c. 1050. The king's treasure chamber was once the crypt under the chapter house. On the left is the dark cloister, from which a doorway leads to the Norman undercroft of the dormitory, now the Abbey Museum. W. A. suffered minor damage in the Second World War. Since then much of the fabric has been found to be badly affected by corrosion. £1m. for restoration was raised as the result of an appeal in 1952-3, and the work of restoration will not be complete under 10 years from that date.

See E. W. Brayley, *The History and Antiquities of the Abbey Church of St Peter, Westminster*, illus. by J. P. Neale, 1818 (the standard authority); J. L. Chester, *Registers of the Abbey of St Peter, Westminster*, 1876; Dean Stanley, *Historic Memorials of Westminster Abbey* (7th ed.), 1890; W. R. Lethaby, *Westminster Abbey and the King's Craftsmen*, 1906, and *Westminster Abbey Re-examined*, 1925; F. Bond, *Westminster Abbey*, 1909; Lawrence E. Tanner, *The History and Treasures of Westminster Abbey*, 1953.

Westminster Assembly of Divines, Puritan assembly, which sat at Westminster from Aug. 1643 to Feb. 1649. It formulated a Presbyterian system of church gov. in England, but this was never fully applied in practice, and all its work was swept away at the Restoration.

Westminster Bank, one of the 'big five' U.K. banks, estab. originally, in 1834, as the London and Westminster Bank and amalgamated with the London and County Banking Company (estab. in 1836) in 1909 under the name of the London County and Westminster Bank. It acquired Parr's Bank (estab. 1865) in 1918, the Nottingham and Nottinghamshire Banking Company in 1919, Beckett and Company, of Leeds and York, in 1921, and later the Guernsey Commercial Banking Company, Stillwell and Sons, besides a large share of the capital of the Bank of Brit. W. Africa. Affiliated banks are the Westminster Foreign Bank and the Ulster Bank. See also BANKS and BANKING.

Westminster Bridge, London, originally built in 1739-50 by the Swiss architect Charles Labelye, London Bridge (q.v.) being up to that date the only bridge across the Thames. It was replaced in 1854-62 by the present steel structure.

Westminster Cathedral, Eng. Rom. Catholic Metropolitan church, London. The site, part of what was once known as Tothill Fields, was acquired by Cardinal Manning (q.v.); his successor, Cardinal Vaughan (q.v.), carried out the building of the cathedral, 1895-1903. The architect, J. F. Bentley, designed a remarkable building in early Byzantine style. It is 385 ft long and 156 ft wide, and covers 54,000 sq. ft; the height of the campanile is 284 ft, and of the nave (the widest in England) 117 ft. The Stations of the Cross on the piers were carved by Eric Gill. There are 11 chapels, and in the chapel of St George and the English Martyrs (N. aisle) are the remains of John Southworth, executed under Cromwell in 1654. The decoration of the cathedral has never been completed, and in 1955

the authorities decided to proceed with the execution of coloured mosaics, etc., for the nave walls, the chapels, and domes.

Westminster College, founded in 1851, Methodist residential college in London for training of men teachers. A constituent college of the Univ. of London Institute of Education, it provides 2-year courses for teacher's certificate, 4-year courses for degree and teacher's certificate, and 1-year supplementary courses in religious education.

'**Westminster Gazette**,' former London Liberal evening daily paper, estab. in 1892 by George Newnes (q.v.) and remarkable for being printed on pale-green paper. An outstanding feature was the strong front-page article on the political issue of the day; amalgamated in 1928 with the *Daily News* (see 'NEWS CHRONICLE').

Westminster Hall, London, was built by William II in 1097-9 as the banqueting hall for his palace of Westminster. It has been the meeting-place of the chief law courts and some early parliaments, the scene of coronations and other festivals, but is most famous for the great state trials held there. Under Richard II the hall was reconstructed, and a wonderful hammerbeam roof constructed by Hugh Herland, the earliest dateable example (c. 1395) of its kind. Except for modern steel erections, it is probably the largest roof unsupported by pillars. Great care has been needed for its preservation; it has been repaired sev. times, and escaped serious damage when the House of Commons was bombed. Among the great dramas of Eng. hist. enacted here were the trials of Wm. Wallace, Sir Thomas More, Guy Fawkes, Charles I, Warren Hastings, and the deposition of Richard II. The chief law courts sat in the hall until moved to buildings on the W. side, and then moved to the Strand in 1882. W. H. is now used mainly for royal receptions and lyings-in-state. See H. St G. Saunders, *Westminster Hall*, 1951.

Westminster Hospital, first London hospital to be erected by public subscription, founded in 1719 on a site in Petty France. After sev. moves the W. H. was finally estab. in Page Street in 1936-7. A medical school has existed in Westminster since 1834; it was formally associated with W. H. in 1849. Under the National Health Service Act, W. H. was designated an undergraduate teaching hospital. Other hospitals within the group are the Westminster Children's Hospital, the Gordon Hospital, All Saints' Hospital, and 3 convalescent homes. There are 914 beds.

Westminster School, public school for boys in Westminster, London. Early 14th-cent. writers describe it as a grammar school attached to the collegiate church of St Peter, Westminster. Queen Elizabeth refounded it in 1561. The Abbey remains the school chapel, but the legal connection of abbey and school was severed by the Public Schools' Act, 1868.

Westminster Theatre, in Palace Street, London, opened in Oct. 1931. It was at one time noted for its production of ex-

perimental works, and was also under the control of the Oxford Group for a short period. Productions include *Tobias and the Angel*, 1932, *Mourning Becomes Electra*, 1937, *Black Chiffon*, 1949, *Journey's End* (revival), 1950, and *Dial 'M' for Murder*, 1952.

Westmorland, northern co. of England, bounded on the N. and W. by Cumberland, on the S and W. by Lancs. and E. by Yorks. W. suffered from the invasions of the Scots in anct times, Appleby being twice sacked and burnt. During the Civil war the co. was royalist; many of its gentry later espoused the Jacobite cause, though the people took little interest in the rebellion of 1745. Sev. writers are associated with W., including Wordsworth, Hartley Coleridge, De Quincey, Harriet Martineau, and Beatrix Potter. Romney served as an apprentice at Kendal. There are castles at Appleby, Brough, Brougham, Kendal, and elsewhere, the ruins of Shap Abbey at Shap vil, and there are many peel towers, fortified dwellings forming a defence against Scottish raiders. W. comprises a considerable part of what is called the fell country and also of the Lake Dist. (q.v.). The mountainous regions, with great tracts of moorland, afford some magnificent scenery, and include Helvellyn (3118 ft), Bow Fell (2960 ft), Great Dun Fell (2780 ft), and many others; while the lakes include Windermere, Ullswater (in part), Grasmere, and Haweswater. The prin. rivs. are the Eden, running through what is known as the Vale of Eden, the Lune, and the Kent. The W. of the co. has a high rainfall, and the E., lying under the Pennines, is cold in winter. Only about half the co. is under cultivation, and of this the greater part is devoted to pasturage, sheep and cattle being raised in large numbers, while dairy herds are reared in the valleys. Lead, gypsum, and diatomite are produced; slate, granite, and limestone are quarried. Manufs. include woollen goods, paper, boots and shoes, tobacco, wood turnery, limestone bricks, and water turbines. The prin. tns are Appleby (the co. tn) and Kendal; the co. returns 1 member to Parliament. Area 790 sq. m.; pop. 67,400. See H. D. Rawnsley, *Literary Associations of the English Lakes*, 1894; H. Collingwood, *The Lake Counties*, 1949; Sir Clement Jones, *A Tour in Westmorland*, 1949, and *Walks in North Westmorland*, 1955; N. Nicholson, *Cumberland and Westmorland*, 1949.

Weston-super-Mare, seaside resort and co. bor. of Somerset, England, 20 m. from Bristol, on the Bristol Channel. Until the middle of the 19th cent. it was a tiny fishing hamlet, but recognition of the invigorating qualities of its air has made it the largest resort of its kind between Land's End and Lancs. W. caters for every taste in amusement. Amenities include golf-links, tennis and badminton courts, the Grand Pier, with an amusement pavilion, a number of public parks and gardens, and a large swimming-pool on the sea-front, which can accommodate 1500 bathers. Pop. 39,650.

Westonbirt, a public school of 300 girls, founded in 1928 at Tetbury, Gloucestershire, on the estate of the late Sir George Holford. It stands in a large park well known for its fine collection of trees.

Westphalia (Ger. *Westfalen*), name given to that part of the N. Ger. plain which is bounded by the Netherlands, Hanover, Hessen, and the Rhine (qq.v.). At different periods the name has been given to:

1. The Duchy of W., which was part of the old Saxon Duchy and which belonged to the Elector-archbishop of Cologne (q.v.). After the sequestration of the church lands, W. went to Prussia and Hesse-Darmstadt (qq.v.).

2. The Kingdom of W., formed at the Peace of Tilsit (q.v.) in 1807 by Napoleon for his brother Jerome (see *BONAPARTE*). It included dists. in the E. not usually associated with Westphalia.

3. The Prussian prov. of W., constituted in 1815. Its area was 7801 sq. m.

4. A part of the present *Land* of N. Rhine-W. (q.v.). The greater part of Germany's coal and heavy industry is in W. (see *RUHR*).

Westphalia, Treaty of, peace treaty signed at Münster, 21 Oct. 1648, ending the Thirty Years' War (q.v.). By its articles France was confirmed in her possession of Metz, Toul, and Verdun, and also obtained the sovereignty of Alsace; Sweden was given W. Pomerania, Bremen, and Verden; and Bavaria, Brandenburg, and Saxony also received accessions of ter. A federation of some 300 independent states replaced the former empire. The independence of Switzerland and the United Provs. of Dutch Netherlands was recognised. Religious toleration was granted to Calvinists as well as Lutherans in Germany, but the principle was not estab. in the Hapsburg ter. The treaty marks the failure of the Austro-Sp. attempt to restore Rom. Catholicism in Central Europe and the beginning of Fr. hegemony in Europe.

Westport: 1. Urb. dist., mrkt tn, and seaport of Clew Bay, co. Mayo, Rep. of Ireland, 12 m. SW. of Castlebar, connected by steamer with Glasgow and Liverpool. Clothing, mineral waters, boots and shoes, cotton thread, shirts, furniture, leather goods are manufactured. W. is a rail-head and W. depot for the C.I.E. railway system, and the junction for tourist traffic to Connemara and Achill. It is a noted fishing centre for salmon and trout.

2. Bor. in Nelson Prov., S. Is., New Zealand, at the mouth of Buller R. Over £2m. have been spent on the harbour works designed by Sir John Coode. W. is the place of shipment for the coalfields in the neighbourhood. To the S. are the alluvial gold-mining centres of Addison's Flat, Croninville, Nine-Mile Beach, and Charleston, the latter now producing much lignite coal, open-cast methods being used. Pop. 5510.

Westrosol, see *ACETYLENE*.

Westward Hol, seaside resort in N. Devon, England, incorporated in Northam (q.v.) urb. dist. W. H. takes its name

from Charles Kingsley's (q.v.) novel. Rudyard Kipling was educ. at the United Services College (now a terrace of houses), which he immortalised in *Stalky and Co.* On Northam Burrows is the championship course of the Royal N. Devon Golf Club, where J. H. Taylor, 5 times open champion, learned and played. Pop. included in Northam (q.v.).

Wet, De, and Weite, De, see *DE WET*, and *DE WETTE*.

Wetaskiwin, city (incorporated in 1906) of Alberta, Canada, 42 m. S. of Edmonton, a junction of the Canadian Pacific Railway. The name is derived from the Cree word meaning 'hills of peace.' W. is situated in the centre of a fine mixed farming and live-stock area; the region has rarely known a crop failure. Flour mills, stock yards, and coal beds are located in the area, and there are creameries and lumber works. New industries are a small packing plant, a tannery, an oil well supply concern, and an oil refinery. Pop. 4200.

Wetherby, mrkt tn of the W. Riding of Yorks, England, on the Wharfe, 8 m. SE. of Harrogate. It has mineral-water and light-engineering industries, a cattle mrkt, and trade in agric. produce. Steeple-chasing events are held here. Pop. (tn) 4200; (rural dist.) 21,800.

Wetherell, Elizabeth, see *WARNER*, SUSAN BOGERT.

Wettaach, Adrien, see *GROCK*.

Wetteren, tn in the prov. of E. Flanders, Belgium, 8 m. SE. of Ghent, on the Scheldt. Chief manufs. are cotton and woollen goods, lace, and tobacco. It is the site of the Belgian national powder-mill. Pop. (1955) 19,800.

Wetterhorn, mt in the Bernese Oberland, Switzerland, F. of Grindelwald. It has 3 peaks, of which the middle, or Mittelhorn, is the highest (12,166 ft). The mt was ascended first in 1844.

Wettin, House of, Ger. royal family dating from about the mid-10th cent. It gave rise to sev. European royal houses, including the Eng. (through Prince Albert, husband of Queen Victoria). The founder of the line was Count Dedo (d. 957). Dietrich II married a daughter of the margrave of Meissen. The importance and extent of the dominions of the H. of W. increased greatly, Lower Lusatia (1135) and the Mark of Meissen (1130) being recognised as possessions. Nuremberg became their cap. Conrad I and his descendants were rulers from 1123 to 1288, when W. co. and castle near the Saale were sold to the Archbishop of Magdeburg. He retained them till the Peace of Westphalia (1648); the elector of Brandenburg then claimed them, and they were finally annexed to Prussia (Saxony).

Wetzlar, Ger. tn in the *Land* of Hessen (q.v.), on the Lahn (q.v.), 34 m. NNE. of Wiesbaden. Its splendid abbey church dates back to the 9th cent., and the tn provided the background of Goethe's (q.v.) *Sorrows of Werther*; there is a Goethe museum. There is a famous camera and optical-instruments industry, and textiles are manufactured. Pop. 28,000.

Wewak, airfield and harbour on the N. coast of Brit. New Guinea. From 1942 it was developed by the Japanese as a main supply base, and was recaptured during May 1945.

Wexford: 1. Maritime co., in the SE. corner of the Rep. of Ireland. The surface is hilly in the N. and W., the greatest heights being reached in Mt Leinster (2610 ft), and Blackstairs Mt (2409 ft). Owing to sandbanks, the coast is dangerous, and the only opening of importance is Wexford Harbour and Bay, while Waterford Harbour divides it from the co. of that name in the S. Off the coast to the SE. is Tusker Rock with a lighthouse, and farther S. are the Saltee Is., beyond which there is a lightship. The prin. rivs. are the Barrow and the Slaney, both navigable for a long distance. Agriculture is successfully carried on, and sheep and cattle, pigs and poultry are reared. Barley is the main crop; other cereals and sugar-beet are grown extensively; the fisheries are important. The prin. tns are Wexford (the co. tn), New Ross, Enniscorthy, and Gorey. The co. returns 5 members to Dail Eireann. There are a number of anct monuments in the co., including Dunbrody Abbey, Ferns Abbey, and the castles at Ferns and Enniscorthy. The area is 908 sq. m.; pop. 91,700.

2. Municipal bor. and seaport, cap. of co. Wexford, Rep. of Ireland, on the R. Slaney. Its importance is mainly due to the harbour, which is formed by the estuary of the riv., but owing to a bar across the mouth big vessels are unable to enter at ebb tide, and in consequence the harbour of Rosslare was built and connected by rail with W. (8 m.). The tn is of anct foundation. It was walled by the Danes in the 9th cent., and occupied by them until 1169; it received its first charter in 1318; it contains the ruins of St Sepulchre's Abbey and some fragments of the old tn walls, and the barracks are on the site of an anct castle. The tn was besieged by Cromwell in 1649, garrisoned by Wm III, 1690, and was captured and held for a month by the Irish pikemen during the rebellion of 1798. The chief industries are the manuf. of agric. machinery, and farm implements, laminated springs, and furniture. The tn is the centre of important fisheries. Pop. 12,300. See P. H. Hore, *History of Wexford*, 1906.

Wey, riv. of England, rising in 2 streams, one near Alton in Hants and one near Haslemere in Surrey, which join at Farnham and flow NE. past Godalming and Guildford to the Thames at Weybridge. Length 35 m.

Weybridge, urb. dist. (with Walton) of Surrey, England, at the junction of the Wey and the Thames. W. is mainly a residential tn. Pop. (Walton and Weybridge) 39,420.

Weyburn, city of S. Saskatchewan, Canada, 70 m. SE. of Regina on the main route from the U.S.A. into W. Canada. Centre of a rich agric. area, and near the Williston Basin oilfields, the city has elevators, creameries, flour mills, and a

wire and cable plant. It is the site of a prov. mental hospital. Pop. 7150.

Weyden, Rogier van der, see ROGIER VAN DER WEYDEN.

Weygand, Maxime (1867-), Fr. soldier of Belgian descent, b. Brussels. Educ. at St Cyr, he was commissioned in the cavalry in 1888. He served in the colonial army until 1914, when he became chief-of-staff to Foch. He went to Poland in 1920, reorganised the Polish Army, and inflicted a defeat upon the Russians. From 1923 to 1924 he was high commissioner in Syria. In 1930 he became chief of the general staff, and in 1931 president of the supreme war council.

On 19 May 1940 he was appointed chief of the Fr. general staff and commander-in-chief in all war theatres. After the Ger. break-through he organised a defensive line on the Somme, which was broken during early July. On the eve of the Fr. collapse, when Reynaud resigned, Pétain (q.v.) appointed W. his vice-premier, and thereafter it was never evident on which side he was really acting. In Sept. 1940 he was appointed High Commissioner for Fr. Africa, and in July 1941 governor-general of Algeria, while retaining his position as delegate-general of the Vichy Gov. in Fr. N. Africa, to which he had been appointed a month earlier. But his administration evidently did not satisfy Pétain, for in Aug. 1941 Darlan was given power to direct Vichy's general policy in N. Africa, thus rendering W. subordinate to him, and soon afterwards W. was divested of all military powers, while remaining nominally delegate-general. After the Allied landings (Nov. 1942) matters came to a climax, his post of delegate-general was abolished, and he retired, probably at the instance of Hitler. He was arrested by the Germans in 1942 and interned until freed in 1945. In 1948 the sentence of infamy, passed upon him as a member of the Vichy Gov., was quashed. See J. Weygand (trans. by J. H. McEwen), *The Role of General Weygand; Conversations with his Son*, 1948.

Weyman, Stanley John (1855-1928), novelist, b. Ludlow, Salop. Educ. at Shrewsbury and Christ Church, Oxford. He studied law, was called to the Bar in 1881, and practised for about 8 years. His novels are nearly all historical, and in this vein he was specially popular. His books include: *A Gentleman of France*, 1893, *Under the Red Robe*, 1894, *The Red Cockade*, 1895, *Chippinge*, 1906, and *Queen's Folly*, 1925.

Weymouth: 1. And Melcombe Regis, seaport, holiday resort, municipal bor. of Dorset, England, at the mouth of the Wey. Its popularity as a seaside resort dates from the time of George III, who often resided at Gloucester House. W. and M. R., on opposite banks of the riv., are connected by bridges. To the S. of Weymouth Bay is the Is. of Portland. The chief industries are the quarrying of Portland stone, shipbuilding, sail and ropemaking, brewing, and fishing. Pop. 36,850.

2. Township of Norfolk co., Massachusetts, U.S.A., 11 m. SSE. of Boston. It manufs. boots and shoes, tools, machinery, fertiliser, rubber belting, and lacquer; there is also wool processing. Pop. 32,690.

Whale, name for most of the members of the family Cetacea, in the class of mammals, hunted for the oil, whalebone, spermaceti, ivory, etc., which they yield. The family of Cetacea is divided into 2 groups, the toothed W.s (Odontoceti) and the whalebone W.s (Mystacoceti), the former including the sperm W., or cachalot (q.v.), the dolphins, porpoises, and narwhal; the latter the right W.s and the orquals from which are derived oil and whalebone. The largest of the toothed W.s is the sperm W. (*Physeter catodon*). It yields the most valuable of the W. oils, in addition to spermaceti and ambergris. The bottle-nosed W. occasionally visits Brit. waters. The white W. is found mostly off Labrador and Canada. Of the whalebone or right W.s the most important formerly were the Greenland W. (*Balaena mysticetus*) and the Biscayan W. or Nordkaper (*B. glacialis*). W.s are the most thoroughly aquatic of all mammals, the forelimbs being reduced to fin-like paddles and all external traces of the hind limbs having virtually disappeared. They occur in all seas. Most W.s are inoffensive creatures and swim in herds. When they rise to the surface the heated air expelled condenses and forms a column of spray, the 'spouting' of the W. The whalebone W.s still develop rudimentary teeth before birth, but then these are displaced by a large number of flattened plates of bone or baleen fringed at the edges, which strain the food from the water. Whalebone is derived principally from the right W., and, being strong, light, and flexible, has many uses. W.s stranded on shore die by suffocation, their own weight crushing the lungs.

Whale Fisheries are of anct origin, the Norwegians and the Basques having sought the valuable whalebone and oil-producing mammals as early as the 9th cent.; the Norwegians are still foremost in this industry. In modern times whale fishing, chiefly of orquals, has become so profitable commercially that the W., a slow-breeding animal, is in danger of being overfished, and international agreements limit the total kill. (See DISCOVERY COMMITTEE.) Practically the whole of the animal is utilised in one form or another: the oil as a lubricant, or for making soap, candles, and margarine (W. oil forms 10 per cent of the total world production of edible oils); the whalebone is employed by corset manufacturers and in the brush trade; the prepared flesh is used as a cattle-food; the flesh and ground bones as soil fertilisers; ambergris, an intestinal exudation of diseased sperm W.s, is a valuable ingredient in the manuf. of perfumes. Some parts of the flesh are suitable for human consumption.

In 1870 Foyin, a Norwegian, invented the shot-harpoon, which revolutionised

whale fishing and made it more deadly, the harpoon being shot from a gun into a vital part of the sea-monster. An electric harpoon has been used since 1949, passing an electric current to paralyse or kill the animal, but crews assert that cruelty is still involved. A 'factory ship,' for processing the catch, is used, with some 10 vessels for hunting. In 1955-6, 58,158 W.s were killed. W. fisheries are carried on near the coasts of Greenland and Newfoundland, but the Antarctic, in the summer months, supplies 80 per cent of the catch. In the Azores the sperm W. is still hunted by a hand harpoon in the 19th-cent. style. Herman Melville's *Moby Dick*, and *The Cruise of the Cachalot*, 1806, by F. T. Bullen, give a good description of whaling. See also A. G. Bennett, *Whaling in the Antarctic*, 1931; A. G. Villiers, *Whaling in the Frozen South*, 1931; J. J. Jenkins, *Whales and Modern Whaling* (new ed.), 1945; R. C. Murphy, *Logbook for Grace*, 1948; J. Grierson, *Air Whaler*, 1949; J. R. Norman and F. C. Fraser, *Giant Fishes—Whales and Dolphins*, 1949; R. B. Robertson, *Of Whales and Men*, 1956.

Whale, Sperm, see CACHALOT.

Whale, White, see BELUGA.

Whalley, vil. of Lanes, England, on the Calder, 8 m. from Blackburn. Here in 1206 was founded a Cistercian Abbey, of which some remains exist. Pop. 4000.

Whangarei, tn of W. co., N. Is., New Zealand, 131 m. N. of Auckland by rail. It is the chief tn and seaport for an extensive agric., pastoral, and fruit-growing dist. Coal mining is carried on at Kamo 4 m. away, whilst dairying is also an important industry, there being sev. factories in the dist. There are also cement works and sawmills. Pop. 13,356.

Wharfedale, in the W. Riding of Yorks, England, is that part of the valley of the Wharfe beginning near Wetherby and continuing until the source of the riv. on Cam Fell. Lower W. is a rich agric. dist. At Harewood stands a ruined medieval 'tower type' castle. Ilkley, the largest tn, was the Rom. settlement of Ollicana. Upper W., above the ruins of Bolton Priory (q.v.) founded in 1121, and Barden Tower built by Henry, Lord Clifford, is pastoral country of great beauty with noted literary associations: its centre is Grassington. Hubberholme church with its rood-loft is at the head of W. See Ella Pontefract, *Wharfedale*, 1938.

Wharton, Edith Newbold (1862-1937), Amer. novelist, b. New York City, daughter of George F. Jones. In 1885 she married Edward Wharton; he later became insane, and they were divorced in 1912. She excelled in her short stories, collections of which are *The Greater Inclination*, 1899, *Crucial Instances*, 1901, *Tales of Men and Ghosts*, 1910, *Xingu*, 1916, and *Here and Beyond*, 1926. During the First World War she organised a French ambulance unit, and in 1924 she was made an officer of the Legion of Honour. Of her novels *Ethan Frome*, 1911, is sometimes thought the greatest. *The Age of Innocence*, 1920, a satire on society, was awarded the Pulitzer Prize, as also was *Old New York*, 1924, in its

dramatic form with the title *Old Maid*; other novels are *The Valley of Decision*, 1902, *The House of Mirth*, 1905, *The Reef*, 1912, *The Custom of the Country*, 1913, *Summer*, 1917, *False Dawn*, 1924, *The Children*, 1928, *The Gods Arrive*, 1932, and the unfinished *Buccaneers*, 1938. *A Backward Glance*, 1934, is a book of memoirs. See studies by R. M. Lovett, 1925; E. K. Brown, 1935; P. Lubbock, 1947; B. Nevius, 1953.

Wharton, Philip Wharton, first Duke of (1698-1731), Eng. Jacobite, only son of Thomas, 1st Marquess of Wharton. Philip went abroad in 1716 and vowed allegiance to the Old Pretender, but the following year he returned to England, and submitted to George I, who created him Duke of Wharton. He opposed the attainder of Atterbury (1723) and shortly after again joined the Pretender, and later entered the Sp. service and fought at Gibraltar, being declared a traitor and outlaw by the House of Lords.

to one of the schemes they are classified as varieties or sub-varieties of the 3 following species: one-grained W. (*T. monococcum*), which possesses a flat, short, compact ear; the 2 flowers of the spikelets produce only a single ripe grain. It is sometimes cultivated on poor soils, in mountainous dists. of Central Europe. Polish W. (*T. polonicum*) has awned glumes, which enclose all the flowers in the spikelet, only 2 of which are fertile. The grain is large and very hard; the crop is grown in S. Europe, but is unsuited to Brit. climate. *T. sativum* is divided into 3 races: (1) ordinary spelt W.s, grown on poor soils, in Central Europe; (2) two-grained spelt W.s, grown in S. Europe chiefly for the manu. of starch; (3) *T. sativum tenax*, which has given rise to all the most important varieties, classified in 4 sub-races, each of which is commonly regarded as a separate species. Hard or flint W. (*T. durum*) is grown around the Mediterranean, chiefly

THE ACREAGE UNDER WHEAT AND PRODUCTION IN THE CHIEF FOREIGN PRODUCING COUNTRIES

Country	Area Harvested (thousands of acres)		Production (thousands of tons)	
	Average 1937-40	1953-54	Average 1937-40	1953-54
Argentina	16,633	12,345	6,406	6,102
China	48,000	e 56,000	33,000	e 36,000
Egypt	1,463	1,858	1,253	1,522
France	12,132	10,426	7,849	8,839
W. Germany	2,805	2,756	2,639	3,129
Greece	2,199	2,581	935	1,378
Italy	12,709	11,787	7,945	8,913
Japan	1,793	1,693	1,338	1,352
Spain	8,572	10,606	2,825	2,978
U.S.A.	62,012	67,661	22,634	31,325
U.S.S.R.	104,000	e 119,000	22,000	e 22,000
Yugoslavia	5,323	4,655	2,707	2,466

e = estimated

Wharton, Thomas (1614-73), anatomist and physician at St Thomas's Hospital, London. He is chiefly known for *W.'s duct*, the duct of the submaxillary salivary gland, and for *W.'s jelly*, the connective tissue of the umbilical cord. He was one of the few physicians who remained in London during the plague of 1665.

Wharton, Thomas Wharton, first Marquess of (1648-1715), statesman, b. Woburn, was a prominent supporter of the Revolution of 1688. He is the reputed author of *Lilli-Burlero* or *Lilli-bullero* (q.v.). He was a commissioner for the union with Scotland, 1706, and in that year was given an earldom. He was one of those who proclaimed George I as King of England, and was rewarded with a marquessate, and the office of lord privy seal.

Wheat, or *Triticum*, grass, the origin of which has not been definitely estab. There are many hundreds of forms in cultivation, and many schemes of classification have been suggested. According

for making macaroni. Turgid or rivet W. (*T. turgidum*) produces red grain with very tall, stiff straw, used for thatching purposes. The grain makes dark-coloured flour, and is too poor in gluten for bread-making. Dwarf W.s have short, stiff straw with small grains. Common W. (*T. vulgare*) includes all the more important varieties grown in the great W. dists. The most modern view of W. classification is based upon the number of chromosomes, which are divided into sets of 7 (genoms).

Winter W.s are sown in autumn, and spring varieties usually in Feb. The yield in different parts of the world in 1937-40 and 1953-54 is shown in the table above. Cases of low average are due to varying causes. In Australia there is a scanty rainfall, e.g. it is only 9 in. in the growing regions of W. Australia, but the abounding sunshine results in superior quality. In Russia the low average, which has persisted for sev. decades, is due to the backward state of

the industry, the expectations of a rapid increase through present-day activity not having been fulfilled. In Argentina droughts, floods, frosts, and locusts seriously interfere with a regular W. yield. The low yield in India is due partly to the arid soil and partly to backward methods.

For diseases of W., see HESSIAN FLY; Rust; SMUT.

The great W.-importing countries are in the W. of Europe, where the pop. is largely industrial, the U.K. standing at the head of the list. The acreage and production of W. in some of the Brit. Commonwealth countries for 1954 are shown in the following table.

	Acreage 1953-54	Pro- duction (thousands of tons)
U.K.	2,217,000	2,664
Canada	25,513,000	16,445
Australia	10,751,000	5,302
India	24,285,000	7,383
Union of S. Africa	3,014,000	567
New Zealand	114,000	128

See J. Percival, *Wheat in Great Britain*, 1934; H. I. Moore, *Crops and Cropping*, 1949; *Statistical Abstract of British and Foreign Trade and Industry* (for years after 1931); *Cereals* (Commonwealth Economic Committee), 1955.

Wheat Fly, see HESSIAN FLY.

Wheatsear, Fallow Chat, Fallow Finch, or *Oenanthe aenanthe*, Brit. bird, being a summer migrant to Britain, often arriving in Feb. It winters in tropical Africa and India. It is about 6 in. long, grey on the upper parts with a black streak from beak to ear and with black quill feathers, wing coverts, and tail feathers. In flight a white patch on the lower back and tail is conspicuous. The underparts are white with a buff tinge on the breast. Its food consists chiefly of insects.

Wheathampstead, vil. of Herts, England, 5 m. NNE. of St Albans, where is the 16th-cent. farmhouse, Mackery End, beloved of Charles Lamb (q.v.) and described by him in one of his essays. Pop. 3400.

Wheatley, Francis (1747-1801), painter, b. London. His fame rests chiefly on the series 'Cries of London'; he also painted landscapes and portraits and decorations for Vauxhall. In 1778 he first exhibited at the Royal Academy, becoming associate in 1790, and R.A. in 1791.

Wheatstone, Sir Charles (1802-75), physicist, b. Gloucester. He was engaged with his uncle as a musical-instrument maker in his earlier life, but his main interest at that time was in experiments in acoustics. In 1823, he pub. a paper, 'New Experiments in Sound,' in Thomson's *Annals of Philosophy*. He was appointed prof. of experimental philosophy at King's College, London, in 1834; 3 years later he was elected F.R.S. He had a wide range of interests, and invented many intriguing instruments (including the Eng. concertina), most of them in connection with electricity. In 1837, in co-operation with Cooke, he took out the first patent for the electric

telegraph. He invented the rotating-mirror method for examining vibrating bodies, and used a similar apparatus to measure the velocity of an electric discharge in conductors, obtaining a value close to that of light. He was a gifted cryptographer, invented the stereoscope, and did work on colours and spectra. His polar clock measured the position of the sun, and therefore the time, by means of the plane of polarisation of scattered light. His name is best known from the so-called W. Bridge, which was devised by S. H. Christie in 1833 and rearranged and recognised by W. See *Scientific Papers of Sir Charles Wheatstone*, 1879.

Wheatstone Bridge, an electrical circuit designed to determine the ratio of 2 resistances. The arrangement is as shown in Fig. 1, where E is a source of E.M.F.,

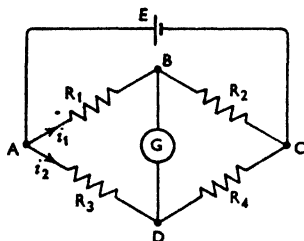


FIG. 1

G is a galvanometer, R_1 and R_2 are two fixed resistances, R_3 is the unknown resistance, and R_4 is a variable known resistance. The value of R_4 is adjusted until no current flows through G, i.e. the potential of B is the same as that of D, and therefore the Potential Difference (P.D.) across R_1 = P.D. across R_3 ; \therefore by Ohm's Law, $i_1 R_1 = i_2 R_3$. Similarly, since no current flows through G, $i_1 R_2 = i_2 R_4$, and it follows that $R_1/R_2 = R_3/R_4$. Hence R_3 is given in terms of the ratio R_1/R_2 and the value of R_4 for 'balance', i.e. no current through G. Two laboratory instruments based on this arrangement are the metre bridge and the post-office box. In the *metre bridge* a long, thin, uniform wire, AB, is stretched alongside a scale (Fig. 2). The ends are soldered to thick copper bars, AH and BD, of negligible resistance. GE is another thick copper bar. A known resistance, R, is placed in the gap HG, and the unknown resistance, S, in gap ED. A galvanometer is connected to the copper bar, EG (at F), on the one hand, and to a movable jockey, C, on the other. The bars AH and BD are connected to the terminals of a battery. The jockey, C, is moved along the wire until the deflection of the galvanometer is reduced to zero. It then follows that $\frac{R}{S} = \frac{\text{resistance of AC}}{\text{resistance of BC}}$. If the wire is uniform the ratio of the resistances of AC and BC is equal to the ratio of their lengths, which can be read

off. A modification of this bridge has been devised by Carey Foster for accurate work. In the *post-office box* the resistances p , q , and r are all arranged in a box. The arrangement is shown in Fig. 3. A number of brass blocks are connected together, inside the box, by carefully adjusted resistance coils of various values. By inserting a plug between adjacent brass

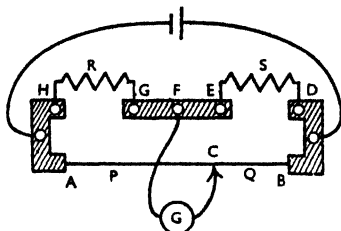


FIG. 2

blocks the resistance that was connecting those blocks is thus cut out. In the actual arrangement the resistances of the arms AC and CB are such that p may be made 10 or 100 times as great as q , and vice versa. The resistance in the arm AD may be made anything from 1 to 10,000 ohms. The unknown resistance is inserted between B and D, the galvanometer between D and C, and the battery between A and B. Both the galvanometer connection and the battery connection can be made or broken by means of the keys K_1 and K_2 respectively. The value of r is adjusted so that no current flows in the galvanometer when K_1 and K_2 are pressed down in the order named, the condition for which is $p/q = r/s$. Thus s can be found with considerable accuracy.

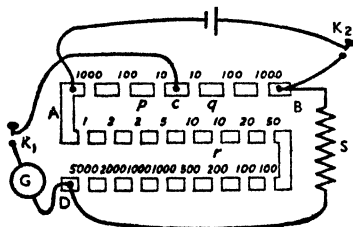


FIG. 3

The resistance of a galvanometer can be found by inserting it in the arm BD instead of s . No galvanometer is then used in the arm DC, and the resistance r is adjusted until the galvanometer deflection remains unchanged when K_1 is opened and closed. The usual relation holds, where the unknown resistance, s , is that of the galvanometer. With moving-coil instruments, however, it is better to clamp the coil of the galvanometer under test, place it in the arm BD and measure its resistance in the usual way with the aid of a

second galvanometer in the arm DC. The resistance of a cell can be found by placing it instead of s in BD and removing the battery in the arm BA.

Wheel, Breaking on the, a form of capital punishment once common in France and Germany, and employed on a few occasions in Scotland. The victim was stretched on a cart-wheel, which then revolved slowly while his limbs were broken with an iron bar. The penalty was sometimes mitigated, either by ordering the executioner to deliver an immediately fatal blow (*coup de grâce*), or, as was general in France, by strangling the condemned after the second or third stroke. B. on the W. was abolished in France at the Revolution; but it was used in Germany down to 1827.

Wheel Animalscules, see ROTIFERA.

Wheel-lock, see FIREARMS.

Wheeler, Sir Charles Thomas (1892-) sculptor, b. Wolverhampton. He studied at S. Kensington. Among examples of his work are the decorative figures and reliefs on India House, S. Africa House, the Bank of England, etc., and the Indian war memorial at Neuve Chapelle. He became A.R.A. in 1930, R.A. in 1940, and in 1944 president of the Royal Society of British Sculptors. In Dec. 1956 he was elected president of the Royal Academy of Arts. He was knighted in 1958.

Wheeler, Sir Robert Eric Mortimer (1890-), a leading Brit. archaeologist. Prof. of the Archaeology of the Rom. Provinces, univ. of London, 1948-55; President of the Society of Antiquaries, 1954; Commissioner Royal Commission on Historical Monuments, England; Member Ancient Monuments Board for England and Wales; Adviser in Archaeology to Dominion of Pakistan, 1948-9; Director-General of Archaeology, India, 1944-8; Director of the National Museum of Wales, 1924-8; of the London Museum, 1926-44. Has been president and served on the Committees of many archaeological bodies. Directed excavations at Colchester, 1917 and 1920; Carnarvon, 1921-3; Brecon, 1924-5; Caerleon, 1926-7; Lydney, 1928-9; St Albans, 1930-3; Maiden Castle, Dorset, 1934-7; in Brittany and Normandy 1938-9; India, 1944-8; Lulworth, Dorset, 1950; Stanwick, Yorks, 1951, etc. Author of many pubs. on archaeology, including books on Rom. London, Prehistoric and Rom. Wales, the Rom. Fort near Brecon, and Research Reports for the Society of Antiquaries on Lydney, Verulamium, and Maiden Castle which are models of their kind in learning and presentation. From his long experience in archaeological method, both in Europe and in the E., his book, *Archaeology from the Earth*, 1954, derives a particular authenticity and is likely to remain a standard for very many years. His autobiography, *Skill Digging*, was pub. in 1955.

Wheeling, city and co. seat of Ohio co., W. Virginia, U.S.A., 45 m. by rail SW. of Pittsburgh on the Ohio R. W. is the industrial and commercial metropolis of the N. Panhandle coal- and gas-producing

region. It has iron and steel works, and manufs. tin-plate, sheet-metal products, tiles, glass, clothing, textiles, tobacco products, food products, and medicine. It also has railroad shops, and is a port of entry. Pop. 58,890.

Wheels. The invention of W. was part of the Bronze Age economy, and is associated with bronze tools and weapons. The wheeled cart was known in Mesopotamia about 3000 BC, in Egypt not before 1600 BC, in Britain during the Late Bronze Age (nave-bands occur in the large hoard from Heathersay Burn Cave, Durham), while in America and other places it was not known until it was brought by modern European trade and settlement. Many prehistoric monuments were constructed from blocks of stone hauled with the aid, no doubt, of rollers beneath a sledge. From this apparatus was evolved the earliest wheel, a slice from a log attached solidly to an axle. Later the wheel, still crude in form, revolved upon a fixed axle. This solid form, however, was necessarily heavy, and as an improvement, in Near E. lands, spokes were introduced about 2000 BC, thus lightening the structure and providing levers to propel the vehicle if the need arose. The potter's wheel, another great milestone in human civilisation, was known, with the cart, in Mesopotamia; it was introduced to Britain by Belgic tribes soon after 75 BC. To-day W. are indispensable, and assume many forms of varied complexity and use, not only in transport but in the internal structure of machines.

Whelk, or **Buokle** (*Buccinum undatum*), carnivorous mollusc, common off Brit. coasts, much used as an article of food. The shell is grey or brownish white, spirally grooved, and with numerous raised ridges. There are other species to which the name is also applied. The name dog whelk is commonly given to *Purpura lapillus*, and also to *Nassa reticulata*.

Wherside, mt in Yorks, England, in the moorlands at the junction of the co. with Westmorland and Lancs. It is one of the highest of the Pennine peaks, rising to 2414 ft.

Whewell, William (1794-1866), philosophical and scientific writer, b. Lancaster; educ. at Trinity College, Cambridge, of which he was master from 1841 until 1866; vice-chancellor of the univ. in 1843 and 1856. W. was not an original observer, and his encyclopaedic knowledge was devoted to co-ordinating the researches of others. His writings in this field are a *History of the Inductive Sciences*, 1837, *The Philosophy of the Inductive Sciences*, 1840, and *History of Moral Philosophy in England*, 1852.

Whickham, urb. dist. of Durham, England, near the R. Derwent. It has coal mines, iron, steel, and soap works, a flour mill, and an electric power station. Pop. 23,000.

Whieldon Ware, term derived from Thomas Whieldon of Fenton (1719-95), the most prominent potter of his time in Staffordshire, which is given to a type of earthenware (q.v.) decorated with multi-

coloured lead-glazes to produce marbling, clouding, and 'tortoiseshell' effects.

Whig, formerly the designation of one of the great political parties in England. The term is of Scottish origin, and was first used in Charles II's reign. According to some, it was derived from *whigamores* or horse drovers, and applied as a term of contempt, though Burnet, in his *History of His Own Times*, gives a different derivation. In England it was eventually assumed as an honoured party name by those politicians who took the lead in placing Wm III on the throne.

Whimbrel, see CULEW.

Whin, see ULEX.

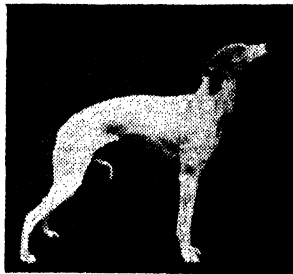
Whinberry, name given to *Vaccinium myrtillus* (see BILBERRY).

Whinchat, or *Saxicola rubetra*, bird that visits Britain in summer, favouring heaths and open places, where it feeds principally on insects. The centre of the throat and breast are a light cinnamon-rufous, as also are the sides of the body, and the abdomen; the general colour above is brown; the head-feathers are edged with sandy-buff. It is a summer visitor to most parts of Europe, and breeds as far N. as the Arctic Circle.

Whip, Brit. party official. All major parties in Parliament have W.s, who see that the members of their parties vote as required by the party leaders. Gov. W.s are members of the administration, but opposition W.s are unpaid. Administrative bodies such as the L.C.C. also have W.s. The term is sometimes used of the message sent to members advising them to be present in Parliament. The importance of the occasion is gauged by the amount of underlining of certain words: thus the term 'three-line Whip.'

Whip-poor-will, or *Antrostomus vociferus*, N. Amer. goatsucker, or night-jar, so called from its cry during the nights of its breeding season. It is about 10 in. long, mottled tawny brown in colour, with a white collar on the throat, and has long, stiff bristles at the base of the bill.

Whip-snake, see DRYOPHIS.



T. Fall

WHIPPET

Whippet, dog particularly favoured in the N. of England, where it is much used for running races, being capable of tremendous speed; trained to make for the

towel held at the end of the course by its owner. The W. was produced by crossing the fox terrier with the lt. greyhound, and then breeding back to the Eng. greyhound. It is bred in various colours, including black, red, white, fawn, and brindle, and its appearance is that of a greyhound in miniature. Its head is long and lean, with small rose-shaped ears, long, muscular neck, deep, capacious chest, long back, arched over the loins; the fore legs are moderately long, and the hind-quarters strong and broad with muscular thighs; the tail is long and tapering.

Whipping, see FLOGGING.

Whipple, George Hoyt (1878-), Amer. pathologist, b. Ashland, New Hampshire. He studied at Yale and Johns Hopkins Univs. From 1914 to 1921 he was research prof. at California Univ., becoming prof. of pathology at Rochester Univ. in 1921. He is especially known for the introduction of the liver diet for pernicious anaemia, and for this work he shared the Nobel prize for medicine in 1934.

Whipsnade Park, property of the Zoological Society of London, is designed for the breeding and exhibition of wild animals and as a sanctuary for native Eng. wild birds and plants. W. P. is on the edge of the Dunstable Downs, Beds. The park is 500 ac. in extent. Some animals and birds are without enclosures or kept in enclosures to which the public are admitted. The park was opened in May 1931.

Whirlpool, vortex (q.v.) or eddy in water caused by interaction of 2 or more currents of different strength, often by the re-uniting of a current divided by an obstacle. Dangerous W.s may occur where tidal currents mingle on coasts; in myth and fiction the dangers are largely exaggerated, as in the case of Charybdis in the Straits of Messina and the Maelstrom of the Norwegian coast.

Whirlwinds, general, unscientific term for atmospheric vortices more usually applied to those not as large or as destructive as typhoons or tornadoes, but sufficiently marked to cause minor acts of damage. They are liable to spring up in deserts as dust devils. Some portion of the ground becomes more strongly heated than surrounding parts, the air in contact rises in temp., becomes less dense, and therefore rises, taking dust and loose paper, etc., with it. The central fall in pressure causes the swirling motions, which may be either clockwise or anti-clockwise. When of large size, a m. or so, and in humid weather, they may have developed from thunderstorms. The lifting action is sometimes considerable, carts, trees, etc., being bodily transported. Sometimes the vertical height of the disturbance is quite small.

See HURRICANE; TORNADO; TY-PHOONS; WATER-SPOUT.

Whisk, see RUFF.

Whisky (Scotch), **Whiskey** (Irish). The word is derived from the Gaelic *uisge beatha*, the alchemist's *aqua vitæ*, 'water of life.' It is the grain spirit distilled

from barley and other cereals which are malted, mashed, and then fermented (see BREWING), and the resulting liquid called the 'wash' passes into the still. W. in Ireland is purely the product of the pot-still, and Scotch W. owes to the pot-still all its character. These malt W.s at their best are, in Scotland, made from barley malt alone, but in Ireland a mixture of malted and unmalted barley, wheat, oats, or rye is mashed together. The pot-still consists of a large copper kettle with a pear-shaped head and connected to a receiver by a copper worm which runs through cold water. The first liquid distilled is of low alcoholic degree and is known as *low wines*, and it is returned to the still to be distilled a second time to become W. The first and last portions of the distillate containing impurities as well as a certain amount of alcohol, called *feints*, are returned to the low wines for redistillation. The W. which leaves the still colourless, is stored in oak casks, in some cases previously used for sherry or malt W., and may remain in them maturing for some 15 years. In Ireland the process of blending various W.s resulting from this process is far less common than in Scotland. In Scotland the great variety of the W.s produced in the malt distilleries led to the extension of the practice of *vatting* (the mixing of spirits distilled at different periods of the year to obtain uniform character) and to an elaborate system of blending. Scotch W. became very popular in England from the mid-19th cent. In 1853 Uschers of Edinburgh began to blend their malt W. with grain W. made by the patent still (see COFFEY'S STILL). There was considerable dispute at first whether the patent-still spirit, distilled at a much higher alcoholic degree and therefore lacking most of the constituents which give true malt W. its flavour and character, deserved the name of W. at all, and it was only admitted to the title by a Royal Commission in 1909. The admixture of this almost neutral spirit toned down the heaviness and richness of flavour of the malt W.s, which were too powerful for sedentary town-dwellers and suited a N. climate. Blending made it possible to adapt Scotch W. to any taste and any climate, ranging from the fine all malt, still drunk in the Highlands and by W. connoisseurs, to W.s of so little individual taste that only experts can discern the differences which justify different labels. The malt W.s of Glenlivet and Speyside rank as the finest of the Highland Malts. Campbeltown Malts are potent, full-bodied, and pungent, Islay Malts, with Lagavulin at their head, are less heavy and powerful, and the Lowland Malts the lightest and least smoky of all. Rye W. is distilled from a mash containing more than 50 per cent of rye, and Bourbon W., originally distilled in Kentucky at Georgetown, Bourbon Co., is from a mash consisting mainly of maize grain. See Aeneas Macdonald, *Whisky*, 1930; Scotch Whisky Association, *Scotch Whisky, Questions and Answers*, 1953.

Whisky Insurrection, uprising in W. Pennsylvania in 1794 against the imposition by the Federal Gov. of the excise law on domestic spirits. Washington sent a body of militia, who without bloodshed pacified the insurgents. This was the first time federal authority was used against a state.

Whispering Gallery, see ACOUSTICS.

Whist, card game for 4 players in which a full pack of 52 cards is used. It was developed from earlier games, such as *Triumph* and *Ombre*, about 1621, and derived its name, apparently, from the Cornish *huist* (silence), owing to the concentration it demanded of its players.

The 4 players cut for partners, and the cards are dealt face downwards to each of them in turn by the player who drew the lowest card. The dealer exposes his last card, which determines the trump suit. The object of each deal is to take as many tricks as possible. The player to the dealer's left leads to the first trick. The remaining players must follow suit if they can; those who cannot may either ruff or discard. The winner of a trick leads to the next one until the 13 have been played, when scores are recorded. Every trick made in excess of 6 scores 1 point. In *short W.* 5 points make a game, and a score of 2 games out of 3 wins the 'rubber'; in *long W.* 10 points make a game. These methods of scoring are seldom used today, and *W.* now survives chiefly in its most elementary forms, as in *German W.* and *W. Drives*. In a *W. Drive* each deal is a separate event and there is no rubber; the trump suit is prescribed beforehand and honours do not count. Since the individual players move from table to table according to the result of each hand, there are no fixed partnerships, and the winners are those who score the highest number of tricks or points at the conclusion of the movement. *German W.* is a game for two players. Thirteen cards are dealt to each as in *W.*, and the top card of the remainder is turned up to determine the trump suit. The dealer's opponent now leads; the winner of the trick takes into his hand the exposed card, and his opponent takes the card below, which he must turn up before he adds it to his hand. The next card on the undealt pile is now turned up, and play continues until the last trick is taken. Scoring is by points, the winner scoring 1 point for every trick he holds in excess of his opponent. A game is 50 points. See also SOLO WHIST; BRIDGE; AUCTION BRIDGE; CONTRACT BRIDGE.

Whistler, James Abbott McNeill (1834-1903), Amer. painter, lithographer, and etcher, b. Lowell, Massachusetts. In 1851 he became a cadet at the military college at W. Point, but decided to follow art as a profession, and in 1856 went to Paris, entering the studio of Gleyre. He was greatly influenced by the newly discovered Jap. colour print and by the work of Courbet. In 1859 he settled in London, there producing his exquisite series of Thames etchings. In portraiture and landscape he evolved a style all his own, his so-called 'nocturnes' showing the Jap.

influence, but in 1877, when some were shown at the Grosvenor Gallery, they were so fiercely assailed by Ruskin in *Fora Clavigera* that *W.* retaliated, suing his critic for libel, and claiming £1000. The case resulted in the plaintiff being granted one farthing damages, but throughout the trial *W.* had shown himself a master of wit. Famous masterpieces are the 'Thomas Carlyle' (Glasgow), the 'Portrait of the Painter's Mother' (Louvre), and the 'Old Battersea Bridge' (Tate Gallery). His painting was beautifully balanced and harmonious; in etchings, lithographs, pastel, and water-colour the delicacy of his art is also seen to advantage, and his 'Peacock Room' (now at Washington) was an original departure in interior decoration.

The Ruskin trial is in *W.*'s own book, *The Gentle Art of Making Enemies*, 1890, which embodies also stimulating critical comment on art. See the life by E. and J. Pennell, 1909; T. R. Way and G. R. Dennis, *The Art of Whistler*, 1903; J. Laver, *Life of Whistler*, 1930; W. Gaunt, *The Aesthetic Adventure*, 1946.

Whistler, Rex (1905-44), painter, illustrator, and stage designer, b. London. He was educ. at Haileybury and the Slade School of Art. Gifted with extreme imagination and little influenced by contemporary artists, *W.* excelled in portraying classical subjects in a romantic vein, while his exquisite illustrations, notably of *Gulliver's Travels* and *Hans Andersen's Fairy Tales*, are masterpieces of draughtsmanship and design. His main achievement is the murals he painted, mostly for private patrons, though the Tate Gallery restaurant, an early work, is widely known. He was killed in the Second World War, leading tanks into battle in Normandy. See life by L. Whistler, 1948.

Whit Sunday, or **Pentecost** (Gk 'fiftieth') festival of the Christian Church celebrated on the seventh Sunday and the fiftieth day after Easter, to commemorate the descent of the Holy Ghost on the Apostles (Acts ii. 1). Its name is probably an abbreviation of White Sunday, a name given to it on account of the white robes then worn by the newly baptised. Whitsuntide corresponds with the Jewish Feast of Pentecost, which commemorated the delivery of the Law on Mt Sinai, 50 days after the Passover.

Whitaker, Joseph W. (1820-95), London publisher. He began business, 1855, as a publisher of theological and fine-art works, and founded the *Bookseller*, 1858. In 1869 he brought out the first issue of *Whitaker's Almanack*, a comprehensive reference book in 1 vol. which has become a standard work of its kind and is pub. annually by the firm which still flourishes under the name of its founder.

Whitbread, Samuel (1758-1815), politician, b. Cardington, Beds, the son of a London brewer, educ. at Eton, Christ Church, Oxford, and St John's College, Cambridge. He became a leading spirit in the opposition to Pitt's gov. He disapproved of the Regency Bill in 1811, and championed the cause of the Princess of Wales in the House of Commons. He

advocated poor-law reform, popular education, the suppression of the slave trade, and other progressive measures.

Whitburn: 1. Par. and vil. of Durham, England, 3 m. N. of Sunderland. It is a seaside resort, and is being developed by the Boldon U.D.C. Pop. 2600.

2. Par. and burgh of West Lothian, Scotland, 3½ m. SW. of Bathgate. It has coal and clay mines. Pop. of burgh, 5500.

Whithy, seaport and health resort of the N. Riding of Yorks, England, at the mouth of the R. Esk, 20 m. NW. of Scarborough. The Abbess Hilda built a monastery at Streonshalh, near W., in AD 656, and here in the year 664 was held a Synod or Council (see next article). Here, too, lived the poet Caedmon, q.v. (fl. 670). The present abbey, reached from the tn by 199 steps, dates from 1220. Near the abbey stands the partly Norman par. church of St Mary. W. has associations with Capt. James Cook, and with the Scoresbys, famous for their whaling exploits and scientific and navigational discoveries, and W. Museum holds many interesting objects connected with them. The old tn has modern holiday amenities and the beautiful Pannett Park. There are local potash deposits; the manuf. of jet ornaments is still carried on on a small scale, and the fisheries are of growing importance. Pop. 11,380.

Whithy Synod of, or Council of Whithy, held AD 663, as the outcome of which England acknowledged the authority and accepted the usages of the Rom. Church. It was convened at a time when Northumbria and Mercia followed the Welsh or Celtic ritual while the rest of England followed the nations of the Continent. The issue was settled after discussion between Colman, the representative of the Celts, and St Wilfrid (q.v.), who obtained from the former the admission that the Pope was the successor of St Peter.

Whitchurch: 1. Par. of Glamorgan, Wales, 1½ m. N. of Llandaff. There are iron and tinplate works. Pop. 19,900.

2. Urb. dist. and mkt tn of Shropshire, England, 19 m. N. of Shrewsbury. There are metal-working and cheese-manufacturing industries. Pop. 7000.

3. Tn of Hants, England, on the R. Test. There are textile and silk industries, and soap and jam factories. Pop. 2800.

White, Elwyn Brooks (1899–), Amer. journalist and essayist, b. Mount Vernon, New York state. Educ. at Cornell, he served as a private in the First World War. Becoming a journalist, he wrote the 'Talk of the Town' column for the *New Yorker*. A brilliant humorist, he collaborated with J. G. Thurber (q.v.) in *Is Sex Necessary?*, 1929. His own books include *Every Day is Saturday*, 1934, *The Fox of Peapack*, 1938, *Quo Vadimus*, 1939, and *The Second Tree from the Corner*, 1954. *Stuart Little*, 1945, and *Charlotte's Webb*, 1952, have become accepted children's classics.

White, Sir George Stewart (1835–1912), soldier, b. Ballymena, co. Antrim. In 1853 he entered the Royal Inniskilling Fusiliers, and later became colonel of the

Gordon Highlanders. He accompanied Lord Roberts to Kandahar, and was awarded the V.C. W. fought in the Sudan War of 1884–5 and in the Burmese Campaign of 1885, being made K.C.B. and maj.-gen. In 1893 he succeeded Lord Roberts as Indian commander-in-chief, and in 1897 became quartermaster-general of the forces. During the Boer War he successfully defended Ladysmith (1899–1900). He was governor of Gibraltar (1900–4), and was made a F.-M. in 1903. See life by Sir M. Durand, 1914.

White, Gilbert (1720–93), naturalist, b. Selborne, Hants, and educ. at Basingstoke Grammar School and at Oriel College, Oxford. He took holy orders and held curacies at Swarraton, Selborne, and elsewhere. He devoted himself to the study of natural hist. around his par. In 1788 he pub. *The Natural History and Antiquities of Selborne* (new ed. pub. in Everyman's Library, 1950), which had been in preparation since 1771. This is his only famous work, though he pub. other papers on natural hist., and some sermons. *The Natural History* is founded on letters and retains the epistolary style throughout; it reflects W.'s unrivalled powers of observation, and is simple and informal in manner. The ed. of this work by T. Bell (1877) contains the rest of W.'s pub. works in a second vol. The Selborne Society (q.v.) pub. a facsimile ed. of his *Flora Selbornensis* in 1911. See life by W. S. Scott, 1946.

White, John (1576–1638), monk, b. near Worcester, became a Benedictine in Spain. He returned to England in 1602 as a missionary. The college of Douai was founded in 1605 in accordance with W.'s plans, and he also brought about the foundation of the monastery there in 1607, transferred first to Acton Burnell and then to Downside (q.v.) after the Fr. Revolution.

White, Sir Thomas (1492–1567), merchant, b. Reading. He was the founder of St John's College, Oxford, and co-founder of Merchant Taylors' School. As Lord Mayor he defended the City against Sir Thomas Wyatt the Younger.

White, William Hale, better known as **Mark Rutherford** (1831–1913), novelist, b. Bedford. He entered the Admiralty as a clerk, and rose to be assistant director of contracts. His works include: *The Autobiography of Mark Rutherford*, 1881, *Mark Rutherford's Deliverance*, 1885, *The Revolution in Tanner's Lane*, 1887, *Catherine Furze*, 1893, and *John Bunyan*, 1905. See his *Early Life and Autobiographical Notes*, 1913, and *Letters to Three Friends*, 1924; also studies by A. E. Taylor, 1914, and Sir W. R. Nicoll, 1924.

White Army, general name for the anti-Bolshevik forces in the Russian Civil War, 1918–20. See CIVIL WAR, RUSSIAN.

White Arum, or **Arum Lily**, see ZANTE-DESCHIA.

White Beam, see BEAM-TREE.

White Flux, see FLUX.

White Horse, Vale of the, in Berkshire, England, see WHITE HORSES AND HILL-FIGURES.

White Horses and Hill-figures are among the most interesting and popular features of the topography of the chalk downland country of S. England. Nearly 50 hill-figures are known in Britain, of which all but 4 are in the chalk country; in this series are 17 white horses, of which no less than 11 are in Wessex, while the rest include giants, crosses, a stag of white quartz at Mormond Hill, Aberdeenshire, an aeroplane, a crown, and an ingenious collection of military badges made in 1916 at Fovant Down in Wilts. The most widely known of the hill-figures are the Uffington White Horse, below Uffington Castle, a hill-fort on the Berkshire Downs; the Cerne Giant, on the hillside above Cerne Abbas village, near Dorchester, Dorset; the Long Man of

to Christianity; and that it was made for some purpose unknown by the Druids or the Romans. It is in fact of very ancient origin, as Sir John Evans pointed out in 1864, when he considered the similarity between this attenuated White Horse with disjointed limbs and beak-shaped head and the horse represented on the gold and silver coins current in SE. England at the end of the Early Iron Age. The study has been developed further by Prof. Stuart Piggott, who calls attention to the horses which appear on the Aylesford and Marlborough buckets, 2 well-known antiquities of the same period, and to the proximity of Uffington Castle, itself a hill-fort of the Early Iron Age. General opinion is that the Uffington Horse was a totem or cult object of the



Ashmolean Museum

THE WHITE HORSE OF UFFINGTON AND UFFINGTON CASTLE

Wilmington on Windover Hill on the escarpment of the S. Downs; and the Bledlow and Whiteleaf Crosses, close together on the Chiltern Hills. These figures are in all probability of ancient construction. With a very few possible exceptions, all the others are modern. The Uffington Horse has inspired many imitations, of which a great number date from the 18th and early 19th cents. The purpose of each hill-figure must be considered on its own merits. Some are landmarks, others have a religious purpose or are memorials, while one at least (the Cerne Giant, *see below*) is associated with a pagan fertility cult.

The Uffington White Horse, length 360 ft., has been known familiarly at least since 1084, when it is noted as a landmark in a charter of the Abbey of Abingdon, and by the 14th cent. it had given its name to the Vale of the White Horse. Sev. theories of its origin have been advanced: that it was cut by Alfred to commemorate his victory over the Dan. host in 871 at Ashdown; that it was a memorial of the conversion of the Saxons

Belgae, a tribe who occupied much of SE. England in the cent. between 50 BC and AD 50.

The Cerne Giant lies in an area rich in prehistoric remains. Just beyond his head is a small 4-sided earthwork, probably of the Early Iron Age, in which an ann. maypole celebration took place until quite recent years. Quite close by are the foundations of the Benedictine abbey of Cerne. These points must be considered in any attempt to explain the age and purpose of this blatantly male figure, 180 ft in height, with a great club in his right hand, his left outstretched as though in the act of grasping. He is represented in outline, marked by a 2-ft trench. A great deal of legend and speculation has grown up in association with the Cerne Giant, but Prof. Piggott, in a recent study, has put forward a most convincing case for his identification with Hercules and his association with a fertility or Priapus worship revived by the Emperor Commodus towards the end of the 2nd cent. AD.

The Long Man of Wilmington, 231 ft

in height, has a staff in each hand; the figure is outlined by trenches defined by white-painted bricks, and is in the care of the Sussex Archaeological Trust. Nothing is known of its early hist., but there has been a great mass of conjecture, most of it quite fanciful, associating the Giant with the Celts, Romans, Saxons, and Druids, various mythological characters, astronomers, and the Benedictine monks of the nearby priory of Wilmington, which was dissolved in 1414. The latest writer, Morris Marples, inclines to the view that the Giant was 'something in the nature of an advertisement, like an inn sign to catch the eye of the traveller from a distance . . . and direct him towards the priory below, where rest and refreshment were to be found.'

The following may also be noted: the Westbury Horse on Bratton Down, Wilts, made in 1778 on the site of an older horse; Cherhill Horse on Marlborough Down, 1780; the new Horse at Pewsey to commemorate the Coronation, 1937; the Osmington Horse near Weymouth with its rider, usually identified as George III.

See Sir F. Petrie, *The Hill-figures of England* (occasional papers of the Royal Anthropol. Inst. No. 7), 1926; S. Piggott, 'The Uffington White Horse,' in *Antiquity*, vol. v, and 'The Cerno Giant' in *Antiquity*, vols. vi and xii; M. Marples, *White Horses and other Hill-figures*, 1949.

White House, official residence of the U.S. president, in Washington. It is built of freestone, in the Eng. Renaissance style, and constructed between 1792 and 1799. The original interior and part of the walls were burned by Brit. troops during their occupation of the city in 1814. Early in 1949 it was discovered that the whole interior structure had become unsafe, and that a new building would have to be erected inside the old walls. The \$54m. worth of repair work and improvements was completed by the beginning of 1952.

White Lead, basic carbonate of lead, having the formula $2\text{PbCO}_3 \cdot \text{Pb(OH)}_2$. The compound is manufactured by sev. processes, the simplest of which consists in grinding litharge with water and sodium bicarbonate. The Dutch process, by which the best-quality W. L. is prepared, is carried out by placing spirals of sheet lead in pots at the bottom of which is vinegar, and covering with spent tan or dung for 4 or 5 weeks. The vinegar gradually evaporates through the heat generated by the tan and attacks the lead, forming a basic acetate. This is converted to W. L. by the action of the carbon dioxide evolved from the decaying tan. W. L. is a heavy powder, which is used as a pigment. Although very poisonous and liable to blacken in the presence of hydrogen sulphide, it is used extensively, as no substitute has been found which possesses the same covering power or 'body'.

White Leg, popular term for a condition in which the lower limb becomes white, swollen, and painful as a result of thrombophlebitis in the veins, i.e. infection causing inflammation of their walls and

clot formation in their cavities. W. L. is most commonly seen following childbirth, though it may also occur during convalescence from febrile diseases such as pneumonia and typhoid fever. There may be a danger of blood clots becoming detached and passing to other parts (see EMBOLISM). Now that puerperal infections occur less frequently and, if they do occur, can be treated more effectively, W. L. is not so common as it was.

White Magic, see MAGIC.

White Metal (anti-friction metal), metallurgical term. It is applied either to the copper sulphide produced in the primary stages of obtaining blister copper from copper matte or to the range of tin-base alloys used in engineering for manufacturing bearings. It is used for the lining of bearings, e.g. in locomotives, See METALLURGY.

White Mountains, range of mts in New Hampshire (N.E.), U.S.A., especially the Presidential range in Coos co. (S.), forming a detached portion of the Appalachian system. A tableland, 10-15 m. broad, separates the 2 main groups, the East or White Mts and the Franconia (with Lafayette Peak). Mt Washington, the culminating peak, is over 6200 ft high.

White Nile, see BAHR-EL-ABIAD.

White Pigments, see PIGMENTS.

White Plains, co. seat of Westchester co., New York, U.S.A., 25 m. from downtown Manhattan, on the Bronx R. It is a residential suburb of New York, and manufs. plumbing and heating equipment, wire, cables, concrete pipe, tiles, clothing, dairy foods, textiles, and chemicals. It was the scene of many Revolutionary events and the battle on Chatterton Hill. Pop. 43,460.

White River, a riv. of Arkansas and Missouri, U.S.A., rising in NW. Arkansas, running N.E. into S. Missouri, where it drains part of the Ozark plateau, and returning to Arkansas flowing S.E. and S. to join the Mississippi. Total length about 690 m.

White Russia, see BELORUSSIA.

White Sea, gulf of the Barents Sea in N. Russia. Area over 30,000 sq. m. The main rivs. flowing into it are the N. Dvina, the Mezen', and the Onega. The chief port is Archangel. The sea is frozen from Sept. to May. On the Solovetskiy Is. there is a famous former monastery, now a concentration camp.

White Sea-Baltic Canal, artificial water, way connecting the White Sea with Laeoe Onega, and through it with the Baltic Sea and the Volga. Length 142 m., including 32 m. of canals. The idea was first mooted at the time of Peter the Great, and surveying was carried out in 1915-16. It was built in 1931-3 by forced labour.

White Sulphur Springs, spa and holiday resort of the U.S.A., in Greenbrier Co., W. Virginia. Its mineral springs have made it since the early 1800's a spa comparable with Bath, England. It is 1917 ft above sea-level, in the Allegheny Mts. Pop. 2643.

White Terrier, see TERRIER, OLD ENGLISH.

White Vitriol, *see* ZINC.

Whitebait, fry of herrings and sprats. In the winter and spring young sprats form the great proportion of what is sold under the name, but in the summer W. consists chiefly of young herrings.

Whiteboys, Irish secret agrarian association, of the type known as Ribbonism, formed about 1860. Its members, who were all of the poorest class, had to be Catholics, although the movement was strongly condemned by the Catholic clergy. The aims and methods of the W. varied in different parts of the country, but generally they assembled at night, wearing white shirts, to destroy the property of landlords, Protestant clergy, tax and tithe collectors, and others who were unpopular in the neighbourhood. The movement died down about 1885. The Westmeath Act (1871) declared Ribbonism to be illegal.

Whitechapel, dist. in the bor. of Stepney, E. London, deriving its name from the medieval white chapel of St Mary Matfellow. It is the main centre of the clothing industry in Stepney. In W. are Toynbee Hall (q.v.), the London Hospital (q.v.), and an art gallery estab. 1901.

Whitefield, George (1714-70), founder of the Calvinistic Methodists in England, and one of their leaders in Wales, b. Gloucester, studied at Pembroke College, Oxford. W. was ordained deacon by Bishop Benson (1736). After a visit to Gloucester and Bristol he set off to join the Wesleys in America (1737). W. remained in America till towards the close of the year. He then began that course of preaching in association with Wesley which estab. Methodism (q.v.) as a popular faith. W. set the example of open-air preaching (1739) near Bristol, and made a great impression as an orator. His stern Calvinism led to a breach with the Wesleys, but he received great support from others, who in 1741 built a tabernacle for him in Moorfields, London. He was provided with a centre in Tottenham Court Road, London, where the Whitefield Tabernacle was built. His type of Methodism developed in the Calvinistic Methodist Church. His *Select Works* were ed. by J. Smith in 1850. *See* lives by L. Tyerman, 1876-7; J. P. Gledstone, 1900; A. Belden, 1930.

Whitefield, urb. dist. of Lancs, England, also known as Stand, 5 m. N. of Manchester. It is mainly residential. Pop. 13,000.

Whitefish, *see* COREGONUS.

Whitefish Bay, vil. in Wisconsin, U.S.A., N. residential suburb of Milwaukee. Pop. 14,700.

Whitehall, London, main thoroughfare between Trafalgar Square and the Houses of Parliament, and the administrative centre of the U.K. It derives its name from, and is situated on, the main courtyard of the old palace of Whitehall that was largely destroyed by fire in 1698. A mansion was built here in the early 13th cent. by the great justiciar Hubert de Burgh (q.v.), who bequeathed it to the Black Friars of London, from whom it was

bought by Walter Gray, Archbishop of York, c. 1250. It became the residence of the Archbishops of York until taken from Wolsey by Henry VIII, who enlarged it and renamed it Whitehall, and it remained the chief royal residence in London for about 150 years. There were additions to the buildings at various periods. The fine Banqueting House which survives, the first building in England in the Palladian style, was built by Inigo Jones for James I. From a window in the hall Charles I stepped to his execution in the street below. Later it became a chapel until closed by Queen Victoria, who allowed it to be used by the Royal United Service Institution (q.v.) and its Museum. Among the gov. offices in W. are the Admiralty, Home Office, War Office, and Ministry of Health. Much rebuilding and resiting of gov. offices is proceeding on the E. side. Parliament Street is the S. continuation of W., and West of their junction is Downing Street (q.v.). *See also* CENOTAPH; HORSE GUARDS. *See* G. S. Dugdale, *Whitehall Through the Centuries*, 1950.

Whitehaven, municipal bor., seaport, and mrkt tn of Cumberland, England, 41 m. SW. of Carlisle. There is a light-house on the W. pier of the harbour. It has extensive docks, collieries (some of which extend under the sea), clothing and silk manufs., chemical and cement works, brickworks, and a tannery and flour mill. Pop. 24,940.

Whitehead, Alfred North (1861-1947), mathematician and philosopher, b. Ramsgate, educ. at Sherborne School and Trinity College, Cambridge, where he became a Fellow in 1884 and lecturer (1885-1910) in applied mathematics and mechanics. He was lecturer in applied mathematics, Univ. College, London (1911-14), prof. at the Imperial College of Science, London (1914-24), and prof. of philosophy at Harvard Univ. (1924-37). W. was president of the Mathematical Association (1915-16). He was elected Fellow of the Royal Society (1903), and of the Brit. Academy (1931), and gained the O.M. (1945). He collaborated with Bertrand Russell in *Principia Mathematica* in 3 large vols., 1910-13, and was the author of many valuable philosophical works. His first work in the field of logic and mathematics was *A Treatise of Universal Algebra*, 1898. Amongst his other numerous works on various subjects may be noticed the following; *The Organisation of Thought*, 1916, repub. in 1928 as *The Aim of Education*, is a criticism of the examination system. His *Principle of Relativity*, 1922, supplies an alternative rendering to that of Einstein. W.'s *Process and Reality*, an essay in cosmology, 1929, along with his Lowell Lectures *Science and the Modern World*, 1926, and *Adventures of Ideas*, 1933, formed a trilogy. His other philosophical works included: *Religion in the Making*, 1926, *The Function of Reason*, 1929, *Symbolism*, 1932, *Nature and Life*, 1934, and *Essays in Science and Philosophy*, 1948.

In W.'s *Tarner Lectures* (1910) he

rejected the conceptions of Nature which at that time formed the starting-point of physics—that space and time provide the stage on which an endless performance is maintained by ponderable bodies, aether and electricity. He propounded the view that *events* constitute the ultimate components of reality. *Process and Reality* shows the close correspondence between his philosophy and that set forth in Plato's *Timaeus*. The fundamental idea is a process of divine development through which order is gradually evolved out of primeval chaos. The demiourgos of the *Timaeus* corresponds to W.'s 'God' and the Platonic 'ideas' or 'forms' to his 'eternal objects.' See P. A. Schilpp, *The Philosophy of Alfred North Whitehead*, 1941.

Whitehead, George (c. 1636–1723), Eng. Quaker leader, b. near Orton, Westmorland, and converted by Fox. He wandered through England, preaching, and wrote many tracts in support of Quakerism. In 1661 he was heard by Parliament in defence of Quakers at the reading of the anti-Quaker bill. He was imprisoned sev. times, being in gaol almost continuously between 1662 and 1672.

Whiteman, Paul (1890–), Amer. bandleader, b. Denver, Colorado. He started his own jazz band in 1919. This became famous owing to the experimental orchestrations of Ferdy Grofé, the pianist. W. 'discovered' Bing Crosby in 1927. After 1930 he played a large part in commercialising jazz.

Whitening Agents, see BLEACHING.

Whitethroat, migratory bird of the genus *Sylvia*, classified among the Warblers. Two species occur in Britain, *Sylvia communis* and *Sylvia curruca*. The *Sylvia communis*, or greater W., is greyish-brown, with the wing-tips rather darker and the head ashy-grey; tail feathers dark greyish brown, under-surface of the body white, and the breast pinkish. It is a summer visitor and is found everywhere in England and Wales, Ireland, and over most of Scotland except the N. The general colour of the *Sylvia curruca*, or lesser W., is rather greyer.

Whitford, par. and vil. of Flintshire, Wales, 3 m. NW. of Holywell. Its chief industries are iron works, limestone quarries, and agriculture. Pop. (estimated) 3500.

Whitgift, John (c. 1530–1604), prelate, b. Grimeby, and probably educ. at St Anthony's School, London. He then studied at Cambridge, and became a fellow of Peterhouse (1555), Lady Margaret prof. of divinity at Cambridge (1563–7), master of Pembroke Hall and of Trinity College, Cambridge (1567–77), dean of Lincoln (1571), Bishop of Worcester (1577), and Archbishop of Canterbury (1583–1604). He advocated the doctrines of Calvin, but supported Anglican ritual and was a strenuous opponent of the Puritans. In his primacy the High Commission Court (q.v.) was permanently estab. He founded an almshouse and W. School (q.v.) at Croydon (1595). See life by J. Strype, 1718.

Whitgift School, public school for boys, founded by Archbishop Whitgift in 1595. It was moved to new buildings in Haling Park, Croydon (q.v.), in 1931.

Whithorn, royal burgh of Wigtownshire, Scotland, 11 m. S. of Wigtown. W. was the landing-place of St Ninian (q.v.), who built a monastery called 'Candida Casa' (397), in which he was buried in 432 and which was long a place of pilgrimage. The priory, now ruined, was rebuilt in the 12th cent. On Wigtown Bay 4 m. SE. of W. is ls. of W., a small port having the ruins of a 13th-cent. chapel. Pop. 950.

Whiting (*Gadus merlangus*), one of the important European members of the cod family. It is abundant in shallow water round the coasts of Britain and Ireland, and extends into the Mediterranean. It is slender in form and differs from most of the other species of the genus in the absence of a barbel. It makes rapid growth, but rarely exceeds 20 in. in length or 2 lb. in weight, and is commonly taken much smaller.

Whiting, see CHALK.

Whiting-pount, see BIB.

Whitley, John Henry (1866–1935), politician, b. Halifax, Yorks, and educ. at Clifton College and London Univ. He was a Liberal M.P. for Halifax (1900–28), junior lord of the Treasury (1907–10), chairman of committees (1911–21), and P.C. (1911). In 1917 he presided over a committee that suggested joint industrial councils of employers and employed, named 'Whitley Councils' (q.v.). He was Speaker from 1921 to 1928, and chairman of the B.B.C. from 1930 to his death.

Whitley Bay, bor. and seaside resort of Northumberland, England, on the N. Sea, 2 m. N. of Tynemouth. Pop. 32,000.

Whitley Councils, or **Whitleyism**, device for securing improved relations between employers and employed. It had its origin in 1916, when the gov. set up the Committee on Relations between Employers and Employed, known, from the name of its chairman, J. H. Whitley (1866–1935), as the 'Whitley Committee.' In one of its reports the Whitley Committee made recommendations regarding conciliation and arbitration which were embodied in the Industrial Courts Act, 1919. Later the committee recommended the formation of joint industrial councils of employers and employees for the consideration of a variety of questions. Labour representatives regarded these recommendations as an unsatisfactory compromise. With gov. approval, however, councils were brought into existence in many important industries and the principle was applied to the Civil Service and to the local authorities. Subsequently, the Whitley Councils sank into the background. There were, however, some successful instances, notably in the flour-milling industry. During the Second World War similar bodies were set up, called joint production committees. See also under INDUSTRIAL RELATIONS; COLLECTIVE BARGAINING.

Whitlow, inflammation of the tissues of the hand. When it occurs in the tissues of the terminal phalanx of a finger it is

sometimes known as a *felon*. Inflammation round the nail bed is known as *paronychia*. W.s have been classified as *subcuticular*, i.e. superficial and immediately underneath the epidermis or cuticle (see SKIN); *subcutaneous*, i.e. underneath the skin and within the soft tissues; *theical*, i.e. within the theca or tendon sheath; and *subperiosteal*, i.e. underneath the periosteum or covering of the bone (q.v.). This classification is somewhat arbitrary, however, since septic infections are apt to disregard anatomical boundaries. The inflammation is due to bacterial infection, and unless checked leads to suppuration. Fortunately antibiotic therapy usually proves effective against W.s; nevertheless, they should not be regarded lightly, particularly those in the deeper structures, as they may cause necrosis (death) of bone or tendon, with consequent deformity or even loss of a finger, or the infection may spread up the arm. As with any septic focus, septicaemia (q.v.) may be caused by a W. In addition to antibiotic treatment it is essential that surgical drainage should be provided for any pus formed.

Whitman, Walt, originally **Walter** (1818-92), Amer. poet, b. W. Hills, Long Is., of Eng. and Dutch descent. He was educ. at public schools in Brooklyn and New York. His early career was very varied. He found an outlet for expressing his democratic sentiments by writing verse, which he pub. in 1855 under the title of *Leaves of Grass*. The metre he employed was entirely original. He discarded the conventional laws of feet and rhyme, and wrote in musical, rhythmic sentences of varied length, modelled on the rhythms of the Old Testament. He was accused of indecency and immorality for his frankness in speaking of subjects usually tabooed, and the book was banned in Massachusetts in 1881, but was given the highest praise by Emerson and Thoreau. W. was an ardent opponent of slavery, and lost an editorial post because of this. From 1863 to 1873 he was in Washington, first as war correspondent and later as a gov. clerk. He devoted all his spare time in visits to the hospitals where he acted as a volunteer nurse. He also lost his position in the dept of the interior because of objections there to poems in *Leaves of Grass*, but obtained another in the office of the attorney-general, which he held until he was partially paralysed in 1873.

The worth of *Leaves of Grass*, W.'s masterpiece, was not fully acknowledged until after his death. Sometimes his disregard for the conventions of metre is obviously self-conscious and forced, and his poetry sinks into a string of names or adjectives. The controversies aroused during his lifetime, however, were largely due to his frank enjoyment of physical beauty, and physical love. His poetry reflected the conflicting moods of his impulsive, highly-emotional and somewhat muddled personality, and, in some of its quieter, more wistful passages, with their skilfully spontaneous onomatopoeia, shows sev. of the characteristics of Ver-

laine (q.v.). His threnodies on death have few equals in any language, and this is especially true of his poem on Lincoln, 'When Lillacs Last in the Dooryard Bloomed.' His triumphant 'Pioneers, O Pioneers' has become almost a national hymn. W.'s other works include, *Drum Taps*, 1865, *Democratic Vistas*, 1871, and *November Boughs*, 1888. His autobiography was pub. in 1892. See studies by J. A. Symonds, 1906; B. de Selincourt, 1913; E. L. Keller, 1921; C. Wells and A. F. Goldsmith, 1922; J. Bailey, 1926; G. Bullett, 1935; H. S. Canby, 1943; R. V. Chase, 1944; also G. W. Allen, *The Solitary Singer*, 1955.

Whitney, Eli (1765-1825), Amer. inventor, b. Westborough, Mass. He graduated from Yale in 1792. He went to Georgia and there devised his machine, the cotton gin. The neighbours stole it and forestalled his patent, so that when, with Miller, he set up a factory in Connecticut in 1793 litigation consumed the proceeds. In 1798 he got a gov. contract for firearms, which provided him with a fortune.

Whitney, Mount, peak of the Sierra Nevada, S. California. It has an altitude of 14,495 ft and is the highest peak in the U.S.A. proper.

Whitstable, urb. dist. and seaside resort of Kent, England, on the Thames estuary, 6 m. NW. of Canterbury, to which it was linked by one of Stephenson's earliest railways. It has famous oyster fisheries, and yacht-building yards. Pop. 17,647.

Whitten-Brown, Sir Arthur (1886-1948), airman, b. Glasgow. In the First World War he served in the R.F.C. and the R.A.F. In 1919 he made the first direct transatlantic flight with Sir John Alcock (q.v.), and was knighted later that year.

Whittier, John Greenleaf (1807-92), Amer. poet, b. Haverhill, Massachusetts, of Quaker parents. Brought up as a farmer's boy, he had little formal schooling, but read avidly, and gained inspiration from the poems of Burns. He became a journalist, and in 1833 pub. an anti-slavery work, *Justice and Expediency*. For 30 years he devoted himself to the cause of abolishing slavery, so that he became venerated as the apostle of human freedom. His vols. of verse include *Songs of Labor*, 1850, *The Chapel of the Hermits*, 1853, *The Panorama*, 1856, which contains the well-known 'Maud Muller' and 'Barefoot Boy', *Home Ballads*, 1860, *In War Time*, 1864, containing the famous 'Barbara Frietchie', *Snow Bound*, 1866, named from a poem that is sometimes accounted his best, *Among the Hills*, 1869, *Miriam*, 1871, *Hazel Blossoms*, 1875, and *At Sundown*, 1890. Greatest in his nature pieces, he was in his day the most popular Amer. poet after Longfellow. His *Life and Letters* was ed. by S. T. Pickard, 1907; see also A. Mordell, *Quaker Militant*, 1933; W. Bennett, *Whittier, Bard of Freedom*, 1941; A. Rowntree, *Crusader and Prophet*, 1946.

Whittington, Richard (d. 1423), Lord Mayor of London, son of Sir Wm Whittington, a Gloucester knight. He was a

London mercer, who held sev. municipal offices, and was thrice Lord Mayor of London (1397, 1406, and 1419). He became extremely rich, lending money successively to Richard II, Henry IV, and Henry V. Around him has grown a legend, the original basis of which is lost. See life by Sir W. Beaunt, 1881; and H. Pearson and H. Kingsmill, *Talking of Dick Whittington*, 1947.

Whittington and Newbold, or **Newbold and Dunstan**, par. of Derbyshire, England, 2 m. N. of Chesterfield (q.v.).

Whittle, Sir Frank (1907-), inventor, b. Leamington. He entered the R.A.F. as a boy apprentice and gained a cadetship to Cranwell college. While still a cadet he became interested in jet-propulsion (q.v.), but received little encouragement until 1936, when he was placed on the special duties list. His first engine ran in the following year, and in 1941 it powered the Gloster E 28/39. He was knighted in 1948.

Whitlesey, or **Whitlesea**, tn of Cambridgeshire, on the Nene, 5 m. E. of Peterborough, with brick manufs. Pop. 8700.

Whitty, **Dame May** (1865-1948), stage name of Mrs May Webster, actress, b. Liverpool, where she first appeared in 1881. A year later she played in London. She acted with Irving, but later turned mainly to comedy. Her plays include *Quality Street*, 1903, and *Night Must Fall*, 1935; her films include *The Lady Vanishes*, 1938.

Whitwood, see CASTLEFORD.

Whitworth, Sir Joseph (1803-87), engineer, b. Stockport. After serving his apprenticeship as a mechanic, he set up in 1833 as a toolmaker in Manchester, and made experiments in rifles, cannons, etc. The Whitworth rifle was invented in 1857, and was adopted by the National Rifle Association in 1860 and by the War Office in 1869. His development of standards for screw-thread and gauge measurements was of great importance. See also ARMSTRONG, SIR WILLIAM GEORGE.

Whitworth, urb. dist. of SE. Lancs, England. It has stone quarries, felt works, cotton works, mills, and engineering works. Pop. 7400.

Whizzer, or **Whizzing Stick**, see BULL-ROARER.

Whooper, see SWAN.

Whooping-cough, an infectious disease due to the *Bacillus pertussis*, and characterised by recurrent spasms of coughing consisting of prolonged expiratory effort followed by a deep inspiration giving the typical 'whoop.' During a severe expiratory phase the face becomes purple, as in suffocation, and is relieved by the inspiration. Paroxysms of coughing occur at night, and during the day are started by anything which increases the depth and rate of breathing, such as running, laughing, or singing. Eating also tends to cause paroxysms. W. is commonly a disease of childhood, but no age is immune, unless immunity has been conferred by a previous attack or by vaccination. The incubation period of about

4 weeks is longer than most infectious illnesses. The quarantine period is usually put at 6 weeks. The early symptoms are catarrhal, as in a cold, but after 7-10 days an irritating cough begins, becoming typically paroxysmal and increasing in frequency and severity until a height is reached during the 3rd and 4th weeks, after which the symptoms recede. The disease can be dangerous in infants and young children of poor physique, pneumonic secondary infection being a complication. In 1954, however, there were only 95 deaths from W. in infants under 1 year old, compared with 2000 in 1920. This reflects improved standards of living and health and better therapeutics. Bronchiectasis and fibrosis of the lung may be sequelae. Immunisation against W. may be obtained by means of a prophylactic vaccine of proved potency, and this is now given to infants, usually in combination with diphtheria prophylaxis. Placing patients in a decompression chamber for 30 min., where they are subjected to a reduced atmospheric pressure equivalent to an altitude of some 12,000 ft, has proved effective in treatment.

Whorl, in botany, a ring of leaves or flowers springing from the stem all in one plane. It is also used in zoology to denote a set of parts arranged in similar fashion. See INFLORESCENCE.

Whortleberry, see BILBERRY.

'Who's Who', Brit. biographical reference work founded in 1848 by Alfred Baily. The first ed. had 250 pages, and sold at half a crown. During the 45 years in which Baily pub. it there was little change in style or content, i.e. list of names of titled and official persons, with no biographical details beyond dates of birth and appointment.

In 1896 copyright and right of continuation in *Who's Who* were offered for sale by auction, and were secured for £30 by the publishers Adam and Charles Black (q.v.). The new publishers announced that what had been a handbook of the titled and official classes only would now embrace all the most prominent persons in the kingdom. For this purpose a *questionnaire*, such as is still used, was devised and the entries written up from the answers. The 1897 ed. contained some 5000 biographies of most of the prominent persons in the kingdom; in later years the number has increased by more than 5 times, and now includes a number of Amer. and foreign personalities of particular interest to the Brit. public. *Who's Who* now has its imitators in almost every country of the world.

Whyalla, tn of S. Australia, on the W. side of Spencer's Gulf, 250 m. from Adelaide by road. It is the shipping outlet for iron ore mined at Iron Knob, 35 m. inland, and has a blast furnace and ship-yards; construction of a steel works was planned in 1955. The tn obtains its water by pipeline from the R. Murray 223 m. away. Pop. 7700.

Whymper, Edward (1840-1911), artist, author, and mountaineer, b. London. He travelled among the Central and W. Alps

(1860) to obtain sketches of Alpine scenery, and ascended Mont Pelvoux (1861). His ascent of the Pointe des Eorins with a party (1864) was a remarkable mountaineering feat. W. also made the first ascent of the Aiguille Verte and in 1865 the famous first ascent of the Matterhorn (q.v.) by the N.E. ridge. W.'s successful ascent was his seventh attempt; during the descent 4 out of the party of 7 were killed. He next visited Greenland (1867, 1872), Ecuador and the Andes (1879-80), and Canada (1901-5). Among his works are: *Scrambles among the Alps*, 1871; *Ascent of the Matterhorn*, 1871; *Chamonix and Mont Blanc and The Valley of Zermatt and the Matterhorn*, 1897-1901. See life by F. S. Smythe, 1940, 1942.

Whyte-Melville, George John (1821-78), soldier and novelist, b. Strathkinness in Fife. Educ. at Eton, he served in the Crimean War. He wrote a number of novels, mainly of a sporting nature, though a few were historical. They include *Kate Coventry*, 1856, *The Queen's Maries*, 1862, *The Gladiators*, 1863, *Satanella*, 1873, and *Black but Comely*, 1879. His *Riding Recollections* appeared in 1875. He died from an accident in the hunting field.

Wiborg, see VYBORG.

Wichita, co. seat of Sedgwick co., Kansas, U.S.A., the largest city in the state, 210 m. SW. of Kansas City. It stands in the centre of a farming, agric., and oil dist., the chief product being wheat. The tn is a milling centre. There are also oil refineries, packing estates, motor-vehicle works, foundries, and machine shops. Friends Univ. and the Municipal Univ. of W. are here. Pop. 168,280.

Wichita Falls, tn of Wichita co., Texas, U.S.A., on the Wichita R., 95 m. NW. of Fort Worth. It exports grain, and manufs. tanks, glass, mattresses, etc. There are oil-wells in the neighbourhood. Pop. 68,000.

Wick, seaport, co. tn, and royal burgh of Caithness, in the extreme N. of Scotland, situated at the mouth of the riv. of the same name. It has a good harbour, herring and white fishing, and cattle marketing. The ruins of the castle, known as the Old Man of Wick, are a prominent landmark. Pop. 7300.

Wick and Lamp Time Measurers. Among primitive time-measuring devices (see HOROLOGY) adopted by the ancients Chinese was a flax or hempen wick, so treated that when ignited it smouldered slowly without breaking into flame. Knots were tied at definite intervals in the flax or hemp, and intervals of time were represented by the distance between the knots. Of more recent date are lamp-clocks, which measured time by the amount of oil they consumed. The construction embodied a glass reservoir fixed on a stand, with a graduated scale to indicate the hrs. The wick was led from the reservoir through an upturned projecting arm, where it was lit to give illumination, thus acting both as clock and night-light, and time was told by the amount of oil left. According to the historian

Asser, Alfred the Great used candles to apportion his day's work. These candles were 12 in. long and burnt away completely in 4 hrs at the rate of an in. every 20 min. They were enclosed in a lantern made of wood to protect them from draughts.

Wicken Fen, nature reserve in Cambridgeshire, England, part of which has been acquired by the National Trust.

Wickford, part of Basildon (q.v.) urb. dist. Pop. 10,000.

Wickham Steed, Henry, see STEED.

Wickliffe, John, see WYCLIFFE.

Wicklow: 1. Maritime co. of Leinster, Rep. of Ireland, bounded on the N. by Dublin, S. by Wexford, E. by St George's Channel, and W. by Carlow and Kildare. The co. is famous for its beautiful scenery. Running through the centre from N. to S. are the Wicklow Mts, with the heights of Lugnaquilla (3039 ft), Kippure (2473 ft), and Duff Hill (2369 ft), between which lie many fine gorges and valleys. The coast is a succession of steep cliffs and sandy beaches. W. and Arklow are the 2 main harbours. The prin. rivs. are the Dargle, Vartry, and Avonmore (Avoca, q.v.); the Slaney and Liffey rise in the W. Mts. Glenmalur (7 m.) reaches into the co.'s finest mt scenery; Glendalough (q.v.) is the site of the world-famous monastery city (7th cent.), and Glencree, the Dargle ravine, has a 300-ft waterfall at Powerscourt Demesne. Lakes include Glendalough, Loch Bray, Lough Dam, the artificial lake at Roundwood, which is the Dublin reservoir, and Poulaphuca (Blessington hydro-electric scheme). Minerals are lead at Glendalough, copper at Avoca, and gold near Woodenbridge, and there is granite at Aughrim and Ballyknockan. There are many castles and eccles. remains. Industries include stock-raising (a special breed of W. mt sheep), milk and dairy products, wheat, oats, seed potatoes, and bulbs. The chief tns are W. (the co. tn), Bray, Arklow, and Balinglass. The co. comprises 8 baronies and returns 3 members to the Dail. Area 500,250 ac.; pop. 60,300.

2. Seaport and co. tn of W., on the R. Vartry, 31 m. SE. of Dublin. St Patrick and St Mannann landed at W. in 431; from the latter is derived the Irish name *Cill* (Church) *Mannain*. The Danes occupied it and gave it the name 'Vikino' or Wicklow. Following the Norman invasion and the building by Fitzgerald of Black Castle, W. was the scene of constant fighting between the clans O'Bryne and O'Toole, down to the final struggle with Cromwell in 1649. The harbour, built at a cost of about £100,000, provides the best shipping accommodation on the SE. coast. Imports are fertilisers, coal, and timber; exports are timber, lead, oatmeal, and sweets. There are remains of a Franciscan friary, 13th cent., built by Fitzgerald, and later under the patronage of the O'Bryne clan. Pop. 3300.

Widcombe-in-the-Moor, vil. of Devon, England, on Dartmoor, 5½ m. from Ashburton. It is famous through the ballad *Widcombe Fair*. Pop. 700.

Widgeon, Widgeon, or *Mareca penelope*, duck which visits Britain in winter, usually breeding farther N. It is about 18 in. long. The plumage is grey and brown pencilled with black, the head and neck reddish-chestnut, the underparts white. Its flesh is valued for the table. The Amer. W. (*M. americana*) is a larger bird and has occasionally reached Britain.

Widnes, municipal bor. and tn of Lancs, England, on the Mersey, 12 m. E. of Liverpool. The W. Transporter Bridge across the Mersey links W. with Runcorn on the Cheshire side; it is proposed to replace this by a new high-level road bridge. The chief industries are chemicals, fertilisers, asbestos, cement, copper, and metal castings. W., with part of the rural dist. of Whiston, returns 1 member to Parliament. Pop. 48,860.

Widor, Charles Marie (1844-1937), Fr. organist and composer, b. Lyons. He studied under Lemmens and Fétis in Brussels. In 1870 he became organist of Saint-Sulpice, in Paris, and in 1890 succeeded Franck as organ prof. at the Conservatoire there. Later he succeeded Dubois as prof. of composition. He is principally remembered for his 10 symphonies for the organ. He also wrote songs, concertos, ballets, and operas, including *Les Pêcheurs de Saint-Jean*, 1905.

Widow, name given to a woman whose husband is deceased, who has not remarried. For her legal rights, see SUCCESSION; INTESTATE; WILLS; JUS RELICTAE; SATT.

Widows' Pensions, see NATIONAL INSURANCE ACT (1946).

Wieschert, Ernst (1887-1950), Ger. novelist and poet, b. Kleinort, E. Prussia. His novels, written in a musical, clear style, are preoccupied with psychological and spiritual questions. In his studies of the impact of war, death, and the artificialities of 20th-cent. civilisation upon mankind, W. attempts to reach past the everyday world to find his solution to the problems he raises, and often achieves heights of thought approaching the mystical. His pubs. include *Der Wald*, 1922, *Die Majorin*, 1934, *Das einfache Leben*, 1939; *Der Totenwald*, 1946, drawn from W.'s own experiences in the concentration camp of Buchenwald, and *Missa sine nomine*, 1950. See H. Eberling, *E. Wieschert, der Weg eines Dichters*, 1937.

Wieck, Clara, see SCHUMANN.

Wieland, Christopher Martin (1733-1813), Ger. poet and novelist, b. Oberholzheim near Biberach in Württemberg; he studied at the univ. of Tübingen. He was of a religious, optimistic outlook, as seen in *Moralische Briefe in Versen*, and *Anti-Ovid*, obviously influenced by Klopstock. In 1759 he became a tutor in Bern and in 1760 at Warthausen Castle near Biberach. Here he came into contact with Eng. and Fr. rococo; his novel, *Der Sieg der Natur über die Schwärmerci*, 1764, ridiculed the romantic novels of his time. Then followed sev. important works: the educational novel *Agathon*, 1766, the educational poem *Musartion, oder die Philosophie der Grazien*, 1768, and

prose trans. of 22 of Shakespeare's plays, 1762-68.

W. greatly influenced Goethe and Schiller, and the school of the later Ger. romantics. His work was the peak of Ger. rococo poetry. There is a good ed. of his works by H. Düntzer, 1882, and by the Preussische Akademie der Wissenschaften, 1909. See W. Lenz, *Wielands Verhältnis zu Spenser, Pope und Swift*, 1903; V. Michel, *C. M. Wieland: la formation et l'évolution de son esprit jusqu'en 1772*, 1938; M. Barthel, *Das Gespräch bei Wieland*, 1939.

Wieland, Heinrich (1877-), Ger. chemist, b. Pforzheim. He studied at Munich, Berlin, and Stuttgart. From 1913 he was prof. of organic chemistry at Munich Univ., moving to the technical univ. there in 1917. From 1921 until 1925 he was on the faculty at Freiburg Univ. In 1925 he succeeded Willstätter (q.v.) at Munich. In 1927 he was awarded the Nobel Prize for chemistry for his research on biological oxidation.

Wieliczka, tn of Poland, in Crakow prov., 8 m. SE. of Crakow (q.v.). There are vast salt deposits under the tn; they have been mined since the 11th cent., and contain remarkable chambers and chapels richly decorated with statues carved out of salt. Pop. 9000.

Wien, Wilhelm (1864-1928), Ger. physicist, b. Gaffken, E. Prussia, prof. of physics at Giessen, Würzburg, and Munich successively; he was awarded the Nobel prize in 1911 for his discovery of 2 laws named after him. His chief work was in connection with radiation, in which branch of physics he discovered that the product of the wavelength for maximum energy density and the absolute temperature is constant.

Wien, see VIENNA.

Wiener-Neustadt, Austrian tn in the prov. of Lower Austria, 30 m. S. of Vienna. It was the Imperial seat under the Holy Rom. Emperor Frederick III (q.v.). The Romanesque and Gothic Liebfrauenkirche was formerly a cathedral. There are arcaded Gothic houses and other interesting buildings, including a Babenberg (q.v.) castle in which Maximilian I (q.v.) was b. The tn was severely damaged in the Second World War. Engines, automobiles, and leather goods are manuf. Pop. 30,550.

Wiener-Wald, see VIENNA.

Wieringen, former Dutch is. in the N. waters of the anct Zuider Zee, prov. of N. Holland. A dyke of about 1½ m., connecting W. with the mainland to the West, was the first step in the reclamation of the Zuider Zee. The enclosing dam of about 19 m. from the other end of W. to the E. was built in 1927-33. S. of W. is the N. West Polder or Wieringermeer, which was the first area of 50,000 acres to be converted into agric. land. It was inundated by the Germans 3 weeks before their final capitulation in 1945, but the area was drained again in the same year.

Wiesbaden (anct Visibada), city of W. Germany, cap. of the Land of Hessen (q.v.). It stands in a valley in the Taunus (q.v.) mts, facing S. across the

Rhine (q.v.). It has been known as a spa since Rom. times; its springs are the *Fontes Matthiaci* mentioned by Pliny. Parts of its anct walls are thought to date from the time of Diocletian. There is a palace (1837-40), which was the seat of the Duke of Nassau until 1866, and was subsequently a residence of the Ger. Emperor. The tn is a cosmopolitan resort, and has a casino, sporting facilities, and good museums and theatres. It produces sparkling wine (*sekt*), and has publishing and film industries. Pop. 247,200.

Wife, see HUSBAND AND WIFE; MARRIAGE AND MARRIAGE LAW.

Wig, artificial head of hair. The use of W.s is very old, and nothing is known of their date of origin, though more details are known concerning particular styles of W.s. There is evidence in Ovid that the Rom. ladies wore blond wigs to enhance their charms. In France they appear to have been worn even before the Middle Ages. They were worn by women in England during the Tudor period: Mary Queen of Scots wore added blond hair at her execution, and Queen Elizabeth I had many W.s in her wardrobe. In the middle of the 17th cent. W.s began to be universally worn by men of the W. civilisations, first to reinforce their own long curls, and at the end of the cent. as separate articles of apparel, hanging long on to the shoulders, worn over a shaved head and, informally, in the house, replaced by a silk or velvet cap. This practice continued until the middle of the 18th cent., when some men began once more to wear their own hair dressed and often powdered (see DRESS; HAIR-DRESSING). At the end of the 18th cent. W.s passed out of general use except for professional and medical purposes. W.s are still worn in England by judges and barristers, and by the Speaker of the House of Commons, during the exercise of their duties.

Wigan, mrkt tn, parl. and co. bor. of Lancs, England, on the R. Douglas 18 m. NE. of Liverpool and 18 m. NW. of Manchester. Evidence exists of a Rom. settlement at W., and there was probably a Celtic settlement even earlier. W. developed gradually as a mrkt tn under the Normans. It bases its claim to be the oldest bor. in Lancs upon a charter of incorporation given by Henry I in 1100. But the first authentic record of W.'s corporate existence is the charter of 1246 granted by Henry III, which constituted the tn a free bor. W. was royalist during the Civil wars. Coal was worked in W. from very early times, but the great coalfield was opened out in the 19th cent., and the working of cotton on a large scale was also begun at this period. In 1888 W. became a co. bor. One member is returned to Parliament.

The most interesting of the older buildings is the magnificent 14th-cent. par. church of All Saints', in the centre of the tn, in Early Perpendicular style. There is a mining and technical college, and a grammar school founded in 1597. The Leeds and Liverpool canal passes

through the tn; the pier on this canal has attained some fame, but its connection with 'Wigan Pier' is now disputed. W.'s industrial development is due to its position on the SW. Lancs. coalfield. Engineering and allied industries occupy an important place in the tn's industrial life. Machinery and equipment for use in Lancs industries is produced. Other industries include artificial silk, bricks and drain pipes, oil and grease manuf., clothing, mining machinery, motor vehicles, rail cars, explosives, shoes and slippers, timber and saw-mills, breweries, chemicals, castings, vulcanite, printing and dyeing, gun-metal steam fittings, and colliery requisites of all kinds. Pop. 84,000.

Wiggin, Kate Douglas (1856-1923), Amer. novelist, b. Philadelphia, daughter of Robert N. Smith. For a time she was a teacher, then in 1881 she married Samuel B. Wiggin. *Timothy's Quest*, 1890, was a successful novel and after a visit to England she pub. *Penelope's Progress*, 1898, with sequels telling of England and Ireland. *Rebecca of Sunnybrook Farm*, 1903, a very popular story, was followed by *New Chronicles of Rebecca*, 1907, and others. *My Garden of Memory*, 1923, is an autobiography.

Wight, Isle of, off the coast of Hants, England, in which co. it is included, in the Eng. Channel, separated from the mainland by the Solent and Spithead. It forms, however, a separate administrative co. returning 1 member to Parliament. Area 147 sq. m.; greatest length 234 m.; greatest breadth 13 m. It has chalk cliffs and downs, the highest elevation being St Boniface Down (787 ft). Off the W. coast are the rocks known as the 'Needles.' The scenery of the I. of W. is picturesque, with its ravines or 'chines.' Yachting is a favourite sport in the is., and Regatta Week at Cowes an outstanding ann. event. Agriculture and tourism are the chief industries; there is boat and shipbuilding, and sawmills. Important tns are Newport (the cap.), Ryde, Shanklin, Ventnor, Cowes, Sandown, and Freshwater (qq.v.). It was the Rom. Vectis, and there are Rom. remains, including villas at Newport and Brading. There is a castle at Carisbrooke, and a Benedictine monastery at Quarr Abbey. Osborne House, 1 m. SE. of Cowes was a favourite residence of Queen Victoria, and Tennyson's home at Farringdon still exists. Parkhurst Prison is on the I. of W. Pop. 95,594. See T. Varley, *Isle of Wight*, 1924; E. Burton, *England's Eden*, 1946; A. de Selincourt, *Isle of Wight*, 1948; G. Church, *The Isle of Wight*, 1949; and separate articles under the tns and vils.

Wightman Cup, lawn-tennis trophy. Mrs George W. Wightman presented it in 1923, to be competed for annually by Brit. and Amer. women amateurs. By 1958 it had been won by Britain 5 times and the U.S.A. 25 times, Britain winning in 1958 for the first time since 1930.

Wigston, urb. dist. of Leicestershire, England, 4 m. S. of Leicester, constituted in 1894; a progressive township, it includes the dists. of Wigston Magna, S.

Wigston, Wigston Fields, and E. Wigston. The dist. comprises residential and industrial areas; industrial development has considerably increased since 1945. There has been a long association with the Royal Leicestershire Regiment, whose barracks are in the urb. dist. Pop. 15,720.

Wigtown: 1. Peninsular co. in SW. Scotland, bounded N. and E. by Ayr and Kirkcudbright cos., and S. and W. by the Irish Sea and N. Channel. Pigmy flints found on the sands of Luce Bay indicate the existence of bands of hunting people here about 4000-3000 BC, and standing stones and remains of hill forts and burial cairns are evidence of Stone and Bronze Age occupation. There are numerous early Christian monuments, including carved stones from the 4th cent. The remains of the Norman priory at Whithorn (where the foundations of the church built by St Ninian in the 4th or early 5th cent. have recently been uncovered) and of the Cistercian abbey of Glenluce (founded 1190) are of interest. No part of the co. is far from the coast, and the sea ensures a mild climate. The surface of the co. is hilly and rough in the N. and level and fertile in the S. The prin. rvs. are the Cree and the Bladnoch, but both are minor streams. In spite of the long coast-line, little sea-fishing is carried on, and the prin. industry is agriculture, with dairy-farming predominating. There is sheep-farming on the hills; some arable farming and raising of beef cattle and other stock are carried on. The chief tns are Stranraer, Wigtown (the co. tn), Newton Stewart, and Whithorn. With Kirkcudbright W. forms the parl. constituency of Galloway, returning 1 member. Area 311,984 ac.; pop. 31,620.

2. Royal burgh (since 1457), and co. tn of the above. Pop. 1400.

Wigwam, hut or cabin of N. Amer. Indians, which consists of a rough conical framework of poles stuck into the ground below and converging above, covered with bark, matting, or tanned hides.

Wilamowitz-Möllendorf, Ulrich von (1848-1931), Ger. classical scholar; b. Markowitz, Posen. He was educ. at Bonn and Berlin. He was prof. of classical philology at Greifswald, 1876, Göttingen, 1883, and Berlin, 1897. He was foremost among the learned men of his day in politics, religion, literature, and philosophy. See study by M. Pohlenz, 1932.

Wilberforce, Samuel (1805-73), churchman, b. London, the third son of Wm W. (a.v.). He upheld the traditions of Anglican orthodoxy during the days of the Tractarian movement and the submission to Rome of Newman, Manning, and others. He became Bishop of Oxford, 1845, and Winchester in 1869. He published *Eucharistica*, 1839, *Agathos*, 1840, and *The History of the Protestant Episcopal Church in America*, 1844.

Wilberforce, William (1759-1833), reformer and philanthropist. He entered Parliament when 21 years old, and soon became friendly with the leading statesmen of the day (especially with Wm Pitt the Younger). He was prominent in

many philanthropic movements, but the great work of his life was in connection with the abolition of slavery, of which cause he assumed the leadership in 1787, though it was not until 20 years later that a Bill providing for the abolition of the slave trade in the Brit. Colonies received the royal assent. (Slavery itself, that is, the status in which many slaves lived after 1807, was abolished in 1833.) See life by R. Coupland (revised ed.), 1945; W. L. Mathieson, *British Slave Emancipation*, 1932; and **ANTI-SLAVERY**.

Wilbye, John (1574-1638), composer, b. Diss, Norfolk, went into the service of Sir Thomas Kytson near Bury St Edmunds about 1595 and remained with the family all his life, lastly with Lady Rivers at Colchester, where he d. He contributed both to *The Triumphes of Oriana*, 1601-3, and to *Leighton's Teares or Lamentations*, 1614, and his 64 madrigals place him among the greatest Eng. representatives of that form.

Wilcox, Ella Wheeler (1850-1919), Amer. poetess, b. Johnstown Center, Wisconsin, daughter of Marius H. Wheeler. Educ. at the univ. of Wisconsin, she first became famous with her *Poems of Passion*, 1883, which were criticised as immoral, though they seem quite innocuous to modern readers. In 1884 she married Robert M. Wilcox, a silversmith. She pub. nearly 40 vols. of verse, which had a wide popularity, her *Collected Poems* being pub. in 1921. *The Story of a Literary Career*, 1905, and *The Worlds and I*, 1918, are autobiographical.

Wild, Frank (1874-1939), naval officer and Antarctic explorer, b. Skeiton, Yorks. He was a descendant of Capt. Cook, and served in Scott's Antarctic Expedition (1901); in Shackleton's Expedition (1907-9); in the Australian Antarctic Expedition (1911); and in 1921 he sailed with Shackleton for the Antarctic, and, after the latter's death at S. Georgia, assumed command of the *Quest*. He pub. *Shackleton's Last Voyage*, 1923. See the *Geographical Journal*, Vol. 95, No. 3, 1940.

Wild Boar, see **BOAR**. **WILD**.

Wilde, Oscar Fingall O'Flahertie Wills (1854-1900), dramatist and essayist, b. Dublin. He studied at Trinity College, Dublin, and at Magdalen College, Oxford. W., a disciple of Pater, there founded an aesthetic cult. He won the Newdigate Prize in 1878. In 1882 W. went to America and lectured on aesthetic philosophy. He had already, in 1881, pub. a vol. of poems, which, in spite of affectations, attracted attention by their finish and the music of the verse. Seven years later he issued *The Happy Prince* (a fantasy) and *Other Tales*. *Lord Arthur Savile's Crime and other Stories*, and his only novel, *The Picture of Dorian Gray*, both appeared in 1891. *Dorian Gray* shows W.'s aestheticism in all its aspects: the search for intense or rare sensations, the ban put on every feeling and belief which sets a limit to the faculty of enjoyment, or captures the soul; the superiority of the true artist over the rules of society or morality.

W. will ultimately be remembered chiefly as a dramatist. With the exception of *Salome*, 1893, his successes were made in the realm of light comedy, where he could give full play to his fantastic wit. *Lady Windermere's Fan*, 1892, *A Woman of No Importance*, 1893, and *The Ideal Husband*, 1895, were each and all successful, but his masterpiece was *The Importance of Being Earnest*, 1895, which places him in the rank of Goldsmith and Sheridan (qq.v.). His regard for literary style, gift of epigram, and rapier-like play of dialogue, produced a drama of brilliant extravagance; however, the insincerity of his sentiments suggest an incurable cynicism. In 1895, following W.'s libel action against the Marquess of Queensberry, who had accused him of perversion, he was convicted of immoral conduct and sentenced to 2 years' imprisonment. From 1897 until his death in obscurity and poverty in 1900, W. lived on the Continent, mainly in Paris. In his humiliation W. found the inspiration of the most powerful lines and of the only moving words which he ever wrote, in *The Ballad of Reading Gaol*, 1898.

See lives and studies by A. Gide, 1905; A. Ransome, 1912; F. Harris, 1916; A. Symons, 1930; G. J. Renier, 1933; H. Pearson, 1946. See also J. E. Agate, *Oscar Wilde and the Theatre*, 1947; H. Montgomery Hyde, *The Trials of Oscar Wilde*, 1948; Marquess of Queensberry and P. Colson, *Oscar Wilde and the Black Douglas*, 1949; G. Woodcock, *The Paradox of Oscar Wilde*, 1949; *De Profundis*, *The Complete Text* (with introduction by Vyvyan Holland), 1949, and Vyvyan Holland, *Son of Oscar Wilde*, 1957.

Wildebeest, see GNU.

Wilder, Thornton Niven (1897-), Amer. novelist and playwright, b. Madison, Wisconsin. He was educ. in China, where his father was in the Amer. consular service, in California, and at Yale. From 1930 to 1936 he was on the faculty of Chicago Univ. His first novel, *The Cabala*, was pub. in 1925. In 1927 appeared *The Bridge of San Luis Rey*, which brought him international fame and for which he gained the Pulitzer Prize. His play, *Our Town*, won the Pulitzer Prize in 1938, and he won this prize for the third time in 1942, with another play, *The Skin of Our Teeth*. *The Ides of March*, a study of Caesar's downfall, told in letter-form, was pub. in 1948.

Wilderness, term applied to barren and desolate regions. It is used especially of an area S. of the Rapidan R., in Virginia, U.S.A., 15 m. W. of Fredericksburg, where a battle of the Civil war was fought between Grant and Lee.

Wilderspin, Samuel, see INFANT SCHOOLS.

Wildspitze, see ÖTZTAL.

Wildstrubel, peak in the Bernese Alps, Switzerland, rising to 10,676 ft. It is near Leukerbad.

Wilenski, Reginald Howard (1887-), art critic, b. London. He was educ. at St Paul's School and Balliol College, Oxford. He has occasioned much con-

trovery over the works of both modern and the older schools of art. He was special lecturer in Manchester Univ., 1933-9, and is editor of the 'Faber Gallery' Art Books. His books include *The Modern Movement in Art*, 1927, *An Introduction to Dutch Art*, 1929, *French Painting*, 1931, *English Painting*, 1933, and *Modern French Painters*, 1940, *Stanley Spencer: Resurrection Picture 1945-1950*, 1951, *Hieronymus Bosch*, 1953, *Douanier Rousseau (1844-1910)*, 1953.

Wilfrid, St (d. 709), ecclesiastic. He was a Northumbrian, b. Ripon, and educ. at Lindisfarne according to the customs of the Celtic church, but later adopted the Rom. usages. W. travelled in France and Italy, and returned to Ripon to found an abbey under the Rom. observance. He was consecrated Bishop of York at Compiègne in 664, and in the same year was the leading advocate of the Rom. view at the Synod of Whitby. W. did much missionary work among the Frisians and S. Saxons; but his lengthy absences from his see led to efforts to supplant him, against which he appealed successfully to Rome. His feast is on 12 Oct. See study by J. Fletcher, 1925.

Wilhelmina, Helena Paulina Maria, Princess of the Netherlands (1880-), daughter of King William II and his second wife, Princess Emma von Waldeck-Pyrmont, b. The Hague. In 1890, after the death of her father, W. succeeded him on the throne, but until her majority under the regency of her mother. On 6 Sept. 1898 she was enthroned at Amsterdam. Queen W.'s simple tastes, sincerity, and complete identification with and devotion to her people made her beloved by all sections of the community. She married Heinrich Wladimir Albrecht Ernst, Duke of Mecklenburg-Schwerin, in 1901. He d. 1934. Their only child, Princess Juliana was b. in 1909. After the Ger. invasion in May 1940, Queen W. and her gov. went to London, from where she broadcast sev. times to her people. After the liberation of her country she returned to the Netherlands with her daughter, who had been living in Canada. In 1948, when she felt that the gov. had been firmly re-established, and having ruled for half a cent., she abdicated for reasons of health in favour of her daughter, who succeeded her as Queen Juliana on 6 Sept., while W. took over the title of Princess of the Netherlands. See life by P. Paneth, 1944.

Wilhelmshaven, Ger. N. Sea port, in the Land of Lower Saxony (q.v.), 102 m. NW. of Hanover (q.v.). It is on the W. arm of the Jadebusen, at the end of the Jade-Ems canal. It was founded in 1853, and after the opening of the harbour in 1869 became the H.Q. of the Prussian N. Sea fleet. After the First World War its fortifications were dismantled, but before the outbreak of the Second World War it had regained its former position. During the War it was the target of many mass assaults by the R.A.F., and in Nov. 1948 the R.N. demolished the gigantic dry dock, the greatest of its kind in

Europe. The tn has various light industries, is a holiday resort, and has therapeutic installations (mud baths). Pop. 101,000.

Wilkes, John (1727-97), political agitator, b. Clerkenwell, London, and educ. at Leyden Univ. He entered Parliament in 1757, and was later active in opposition to the Tory minister, Bute. He founded, in 1762, the *North Briton*, to which Charles Churchill was a valuable contributor, and in the following year was arrested for a libel uttered in the famous No. 45, in which he described the king's speech as false. He was found guilty but pleaded privilege as a member of Parliament. He was expelled from Westminster in 1764, and went abroad for 4 years. After his return he was elected member for Middx by a large majority, but was expelled in 1769 for another libel. He was thrice returned for Middx on the strength of his enormous popularity, but was not allowed to sit until 1790. In 1774 he was elected Lord Mayor of London. W. was a debauchee and a political adventurer; but he had great constitutional importance, for his actions caused the collapse of the much-abused general warrant, gave the Press recognised entry to parl. debates, and estab. the right of an elected member to take his seat in spite of gov. attempts at exclusion. See J. Almon (ed.), *Wilkes' Correspondence*, 1905. See also lives by O. A. Sherrard, 1930; R. Postgate, 1930; and study in P. Quennell's *Four Portraits*, 1945; E. H. Weatherly (ed.), *The Correspondence of John Wilkes with Charles Churchill*, 1954.

Wilkes-Barre, city and co. seat of Luzerne co., Pennsylvania, on the Susquehanna R., in an anthracite coal-mining dist. It has iron and steel industries, cigar factories, silk and other textile mills, and railroad shops. It is the seat of Wilkes College and King's College. Pop. 76,826.

Wilkes Land, part of Australian Antarctic territory, see ANTARCTIC.

Wilkie, Sir David (1785-1841), painter, b. Cultra, in Fife. He studied art in Edinburgh and London, and became R.A. in 1811. He died at sea during his return from travels in Turkey and Palestine. He is famous for such pictures of popular life as 'The Blind Fiddler,' 1806, and 'The Village Festival,' 1811 (both in the Tate Gallery). He also made some able etchings.

Wilkins, Sir George Hubert (1888-), Australian explorer, naturalist, and aeronautical photographer; b. Mt Bryan E., S. Australia, and educ. at the state school, and the Adelaide School of Mines. He served in the Australian Flying Corps in the First World War, and was official photographer, military hist. dept, 1917-18. W. commanded 2 Arctic expeditions, 1926-7 and 1928; led Antarctic expedition, 1928-9, and flew from Deception Island across Graham Land. He was commander of the *Nautilus* submarine expedition to the Arctic, 1931, and manager of the Ellsworth trans-Antarctic expedition, 1933-9. W. was knighted in 1928. His works include *Flying in the*

Arctic, 1928, *Undiscovered Australia*, 1928, *Under the North Pole*, 1931. See also ANTARCTIC EXPLORATION; ARCTIC EXPLORATION.

Wilkins, William, R.A. (1778-1839), architect; b. Norwich, son of an architect. After graduating at Cambridge, travelled in Greece, Italy, etc., 1801-5. Starting practice c. 1806, he designed, among other important buildings, Baileybury College, 1806-9; Downing College, Cambridge, 1807-20; Univ. College, London (his masterpiece), 1827-8; St George's Hospital, London, 1828-9; and the National Gallery, 1834-8. All these buildings are classic in style; but in his extensions of Corpus, King's, and Trinity Colleges at Cambridge he adopted Gothic.

Wilkinsburg, residential bor. of Allegheny co., Pennsylvania, U.S.A., adjacent to E. Pittsburgh. Pop. 31,418.

Wilkinson, Ellen Cicely (1891-1947), politician, daughter of a cotton operative, b. Manchester. She studied at Manchester Univ. She was Labour M.P. for Middlesbrough E. from 1924 to 1931, and for Jarrow from 1935 till her death. In 1945 she was elected chairman of the Labour party, and entered the first Attlee Cabinet as minister of education.

Wilkinson, Norman (1878-), marine painter, b. Cambridge, President of the Royal Institute of Painters in Water Colours and Marine Painter to the Royal Yacht Squadron. He originated the 'dazzle painting' used for ship camouflage in the First World War; was adviser on camouflage to the Air Ministry, 1938-42; and presented 54 pictures of the war at sea to the nation in 1944.

Will, term sometimes used in psychology synonymously with conation to cover all activity, desiring, and striving. It then stands for one of the 3 traditional aspects of mind: feeling, knowing, and conation. More commonly it is used in a more restricted sense, which is also closer to the usage of ordinary speech, to stand for the mind's control of its conative impulses. Thus a man acting under a mere impulse to take what he desires is acting under a conative drive. His will comes into play when he decides to check the impulse, or equally when he decides to give way to it. The essential feature which makes his activity a willed one is that he himself decides whether to check the impulse or to give it free play. Many psychologists believe that W. in this sense is illusory; that in all cases it is the strongest impulse that wins. Thus if a person gets out of bed on a cold morning it is because the impulse to get up is stronger than the impulse to stay in bed, though it may not appear to be so. W. James thought that the appearance of control of impulse arose only from the fact that, in apparently willed activity, use is made of the law of ideo-motor action by which an impulse is carried into action as a result of the mind paying concentrated attention to it. Thus he would explain getting up on a cold morning by supposing that concentrated attention is paid to the idea of getting up so that that idea automatically realises itself and the

person does get up. This puts the difficulty only one step farther back, since W. must be supposed to be effective in changing the train of ideas, if not in affecting action directly. There seems sufficient reason for affirming that our decisions do affect our conduct, and that although there are impulses, desires, etc., which tend to drive us in certain directions, we also have a capacity for resisting those impulses and of making a choice between them. Such a conception is necessary to the ethical idea of sin, which is not merely the carrying out of wrong action but a willed consent to wrong action. It is also necessary to explain the very real difference between the character of the young child acted upon by impulses and the more mature personality able to control its impulses, and also the character differences between those adults with great and little power of control of primitive impulses. Various attempts have been made to measure the difference between persons of strong and weak will, but so far with little success.

One of the objections that has been made to the idea of W. as self-determination is that it seems to contradict the principle of causality on which the mechanical sciences have been built. If the impulses are regarded as forces acting on the personality, the resulting behaviour must be regarded as a resultant of those forces unless there is introduced indeterminacy which corresponds to the W. or unless the W. is regarded as itself caused, that is, determined by some impulse. This line of argument seems less convincing than it once did, since the principle that whatever happens must have a cause seems no longer self-evident. It may mean little more than the linguistic statement that if we are asked why something happened, we can generally give some sort of answer. To the question of why a man chose to do a certain action there may often be an answer in terms of impulses, desires, etc. Sometimes there may be no answer other than that that was what he chose to do. See DETERMINISM; PSYCHOLOGY; CALVIN, JOHN; DESCARTES, RENÉ; HOBBS, THOMAS; HUME, DAVID. See W. James, *Principles of Psychology* (2 vols.), 1907; G. F. Stout, *Manual of Psychology*, 1924.

Will and Testament, see NUNCUPATIVE WILL; WILLS AND TESTAMENTS.

Willeaert, Adriaen (c. 1490-1562), Flemish composer, *b.* Bruges. In 1527 he became chapelmaster at St Mark's, Venice. His compositions included masses, motets, psalms, and hymns. His influence on church music was great; he broadened its character and achieved effect by a wide use of chromatic scales. He also influenced the development of the madrigal. See study by R. Lenaerts, 1935.

Willamette, riv. of W. Oregon, U.S.A. It is formed by the fusion of the Coast Fork and Middle Fork R.s, and joins the Columbia R. near Portland. It is nearly 300 m. in length, and drains an area of 11,250 sq. m.

Willecocks, Sir William (1852-1932), engineer, *b.* India and educ. at Roorkee College, India. He was attached to the Indian Public Works, 1872-83, and to the Egyptian Public Works, 1883-07. W. projected and designed the Asyut Barrage, 1898. K.C.M.G., 1902. His most important work was the irrigation of over 3,000,000 ac. in Mesopotamia begun in 1911. His books include *Egyptian Irrigation*, 1889, *Irrigation of Mesopotamia*, 1905, *From the Garden of Eden to the Crossing of the Jordan*, 1918, and *The Nile Projects*, 1919. He wrote also on biblical subjects.

Willebrod, Saint, see WILLIBROD, St. **Willebroek**, tn in Belgium, 12 m. S. of Antwerp, on the maritime canal from the Rupel to Brussels. It has important paper-mills, engineering workshops, bleacheries, distilleries, salt-works, and manufs. of furniture and chemicals. Pop. 15,200.

Willemstad, city, port, and cap. of the Netherlands W. Indian Terr., and of the is. of Curaçao (q.v.), long noted for its quaint 17th-cent. gabled houses. The famous 16th-cent. governor Peter Stuyvesant (q.v.) is commemorated by a fine statue. W. has one of the finest harbours in the Caribbean, well known for the Queen Emma pontoon bridge, 515 ft long. It has one of the largest oil refineries in the world, which now produces 400,000 barrels of petroleum a day. Pop. 44,062.

Willenhall, tn of S. Staffordshire, England, situated between Walsall and Wolverhampton, about 3 m. from each. W. stands on a coalfield, and coal was dug in the 16th cent. About the same time the manuf. of locks and bolts, still the main industry, was begun, and W. now manufs. 90 per cent of the locks produced in the Brit. Is. Pop. 30,960.

Willesden, municipal bor. of Middx, England, situated by the N.E. corner of the co. of London. The bor., created in 1933, includes the dists. of Brondesbury, Dollis Hill, Harlesden, Kensal Rise, Neasden, Queen's Park, Stonebridge Park, W. Green, and part of Cricklewood, Kilburn (q.v.) and the old par. of W. Twyford. W. was a centre of pilgrimage in the Middle Ages, and was undeveloped until urbanisation followed, mainly in the late 19th cent. The famous W. railway junction is mostly in the bor. of Acton. W. returns 2 members to Parliament. Pop. 177,300.

Willet, William, see DAYLIGHT SAVING. **William I**, surnamed The Conqueror (1027-87), King of England, natural son of Robert I, Duke of Normandy (see ROBERT I). He succeeded at the age of 7 to the duchy of Normandy and to the suzerainty of Brittany, with claims to Maine and the Fr. Vexin (q.v.). In 1053 he consolidated his hold on Normandy by his marriage to Matilda, daughter of Baldwin, count of Flanders (see BALDWIN, Baldwin IV). In 1063 W. invaded Maine and adopted the title of count of Maine. In 1064 he conquered Brittany by his victory at Dinan. W. visited Edward the Confessor in 1051,

when it seems he was recognised by the latter as his heir. It is traditionally said that in 1064 Harold (q.v.) promised to support W.'s claim to the Eng. throne on the death of Edward the Confessor. But in 1066 Harold ascended the throne. W. then invaded England, landing at Pevensey near Hastings with a force which has been estimated at about 10,000 men (including 2000 mounted knights) on 28 Sept., and on the following 14 Oct. met and defeated H.'s army at a place since called Battle, in which Harold was killed. W.'s claim to the throne was by contemporary views fairly sound. He claimed not to have conquered the English but to have defeated a usurper; and he acknowledged the validity of Eng. laws and customs and claimed no prerogative not exercised previously by Eng. kings. By an economic blockade W. secured the surrender of London, and was crowned by Aldred in Westminster Abbey (25 Dec.). In Mar. 1067 he returned to Normandy, leaving his half-brother, Odo of Bayeux, and Wm FitzOsbern as regents. The consequences were a series of rebellions by the barons beginning in the autumn of that year and continuing till 1072, when the last of them was ruthlessly quelled. By this date all Eng. and foreign resistance to W. had also been crushed. In the process, W. ravaged the lands between the Tyne and the Ouse leaving a trail of desolation, especially in Yorkshire.

Some historians have represented the Conquest as an almost entirely destructive *coup de main*, organised by a tyrannous governing clique imbued with alien traditions and intent on the extirpation of the Anglo-Saxon culture and institutions. This, however, is an oversimplification of the question. While modern historians no longer underestimate the great achievements of A.-S. England, nor the suffering which the Conquest must have occasioned, W.'s successful invasion was ultimately to confer many benefits. He brought England within the European system, gave it a gov., an administrative system, and an army, and at the same time a reformed Church subject to the discipline of the common law.

Under W. a system of dependent military tenure became the normal form of tenure. Though the process by which the land was granted by W. is not known, the outcome of the process is set forth in detail in the survey which is known as Domesday Book (q.v.). In the grant of fiefs to his supporters W. kept about one-fourth of the land of England for himself, and the immediate effect of his feudal settlement was greatly to enhance the power of the Crown. In Sept. 1086 W. left England for the last time, and on 9 Sept. 1087 he d. from wounds received at the siege of Mantes.

See also under HAROLD; NORMAN CONQUEST; ROBERT II. See H. W. C. Davis, *England under the Normans and Angevins*, 1919; F. M. Stenton, *William the Conqueror*, 1925, and *English Feudalism 1066-1166*, 1932; P. Orton, *Outlines of Medieval History*, 1933; R. H. Hodgkin,

A History of the Anglo-Saxons, 1940; F. M. Stenton, *Anglo-Saxon England* (Oxford History of England series), 1948.

William II, commonly known as William Rufus (c. 1056-1100), King of England, second son of Wm I. He succeeded to the Eng. throne on the death of his father, his elder brother, Robert, being Duke of Normandy. In 1090 W. acquired E. Normandy and Fécamp from Robert: his intervention in Scottish affairs met with mixed success, but in 1092 he secured the annexation of Cumberland and Westmorland to the Eng. Crown. The last years of W.'s reign were spent in inconclusive wars with the King of France and the count of Touraine. Much of W.'s reign was occupied in disputes with the Church, which became intense after Anselm's (q.v.) appointment to Canterbury. W.'s policy has received much criticism from monastic chroniclers: he was grasping, tyrannical, a degenerate, and apparently irreligious, but in fact he was merely following, though with less finesse and fewer scruples, the policy of his father. He was killed by an arrow while hunting in the New Forest. See also under ANSELM. See E. A. Freeman, *The Reign of Rufus*, 1882; Z. N. Brooke, *The English Church and the Papacy*, 1931; A. Lane Poole, *From Domesday Book to Magna Carta* (Oxford History of England series), 1951.

William III (1650-1702), King of England, Scotland, and Ireland, and stadtholder of Holland, was the posthumous son of Wm II, Prince of Orange, and Mary, Princess Royal of England, daughter of Charles I. b. The Hague. The de Witt party was in the ascendancy during his childhood, but in 1672 W.'s supporters murdered the de Witts. At 22 he was appointed captain-general of the Dutch forces and, not long after, stadtholder. He was largely responsible for the direction of the war against France. But the most far-reaching event of his life was his marriage, in 1677, to Mary, daughter of James, Duke of York, afterwards James II of England. This was the triumph of Danby and W. over Louis XIV. W. cultivated the growing opposition to James II, and when eventually overtures were made to him to invade England he accepted them, and landed with a small force at Torbay, on 5 Nov. 1688. He was crowned joint sovereign with Mary in April 1689. In the following year he defeated James II at the battle of the Boyne, and, having conquered Ireland, proceeded to subdue Scotland. He went to Holland in 1693 and commanded the Dutch army. The peace of Ryswick (1697) was W.'s greatest diplomatic achievement. W. was a generally unpopular, though respected king. His reserve, his apparent neglect of his wife, his Dutch favourites, and his obvious use of England primarily as an instrument for saving Holland from France alienated Eng. affection. His treatment of the Whig party was skilful: though he in fact owed his throne to them, he managed to estab. himself securely enough to rule independently, and often in opposition to

their views. He was hated by the Irish Catholics, who held the treaty of Limerick treacherous, and to a number of the Scots his name was associated mainly with the massacre of Glencoe. His real greatness lies in his struggle against Louis XIV.



WILLIAM III

Engraving after a picture by Netscher.

See lives by G. J. Renier, 1932, and D. Ogg, 1956; G. Burnet, *History of His Own Times* (1897 ed.); M. C. Trevelyan, *William III and the Defence of Holland*, 1930; G. M. Trevelyan, *The English Revolution, 1688, 1689*.

William IV (1765–1837), King of Great Britain and Ireland, was the third son of George III, *b.* Buckingham Palace. He went to sea in 1780, and in 5 years was promoted capt. He was created Duke of Clarence in 1789. Shortly after this he became the lover of the actress, Dorothea Jordan (q.v.). In the interests of the royal succession he married in 1818 Adelaide, eldest daughter of George, Duke of Saxe-Coburg-Meiningen, but none of their children survived infancy. He was appointed Lord High Adm. in 1827 and 3 years later, on the death of George IV, succeeded to the throne. He was boisterous, tactless, but good-hearted, and occasionally as king showed unexpectedly sound common sense, as in his handling of the constitutional crisis, 1830–2. See lives by P. Fitzgerald, 1884, and G. E. Thompson, 1932.

William I (1797–1888), King of Prussia, and emperor of Germany, *b.* Berlin. He was in large part responsible for the absolutist and autocratic ideas which pervaded the rule of the imperial house of Germany. He found in Bismarck a minister anxious to govern according to

his own view, and it may be said that between them they had a large part in the making of Germany as it was before 1914. During the Franco-Prussian War W. commanded the Prussian Army and led his soldiers to the victories of Gravelotte and Sedan. He was proclaimed emperor of Germany in the Palace of Versailles on 18 Jan. 1871. See life by A. Forbes, 1888; see also E. Simon, *The Emperor William and his Reign* (Eng. trans.), 1886; P. Wiegler, *William the First* (Eng. trans.), 1929.

William II (Friedrich Wilhelm Victor Albrecht) (1859–1941), Ger. emperor and King of Prussia; *b.* Berlin; eldest son of the Crown Prince Frederick (afterwards Frederick III) and of Victoria, Princess Royal of Great Britain; and grandson of William I.

He received a military training, and in 1885 had risen to the rank of colonel in the Hussars of the Guard. He married the Princess Augusta Victoria of Schleswig-Holstein. On the death of his father he succeeded as ninth King of Prussia and third Ger. emperor, 15 June 1888. His first action after accession was to pay a round of visits to European countries, including those that had recently been hostile to Prussia. His obvious intention of reducing the chancellor to a mere instrument of his own will led to Bismarck's resignation on 20 Mar. 1890. He attempted, however, to pursue the main lines of Bismarck's policy without possessing Bismarck's skill or powers of adaptability. W., like Bismarck, disliked Parliaments and relied on the Army. W.'s chief ambition was to strengthen Germany's power in Europe by colonial expansion. Too much has been made perhaps of his responsibility for the catastrophic failure of Germany's foreign policy or for the tremendous development of her internal prosperity and her position as a Great Power, for in many respects he acted as a constitutional sovereign, and the blunders of his ministers were not his.

In his strenuous endeavours to widen Ger. influence, he visited Abd-ul-Hamid at Constantinople in 1889 and 1893; and, while maintaining the Triple Alliance (q.v.), he tried for some years to cement a friendship with Russia. He was a frequent and welcome visitor to England until 1895. Eng. people resented his congratulatory telegram to President Kruger after the Jameson Raid, 1896. Relations of Germany with Britain had improved by 1907; but an interview W. granted to the *Daily Telegraph* in 1908, concerning naval co-operation, caused him trouble with his own subjects, and for a while he showed more reticence.

W. was at Kiel regatta on 28 June 1914, when news of the Sarajevo assassination reached him. Probably he personally did not desire, at this stage, anything more than a short, localised war. But he pushed on with war preparations so openly, and showed such complete disregard of the most solemn international agreements, that Russia, France, and Great Britain were soon

irrevocably committed, and a world conflict was inevitable. This had been the aim of the extreme militarists in Germany, and W. thus played entirely into their hands. At first he directed operations and selected the leaders; but after a few months he was virtually subordinate to Hindenburg and Ludendorff. *See also* WORLD WAR, FIRST.

On 3 Oct. 1918, when defeat of the Ger. forces was imminent, he appointed Prince Max of Baden to the chancellorship. In Nov. Prince Max demanded his abdication, and announced it as a fact on the 9th. He thenceforth resided at Doorn Castle in Holland. There was at first talk, especially in England, of bringing him to trial; but, as the peace-temper revived, the idea of holding him individually responsible for the war took on an aspect of absurdity that killed the project. *See* lives by E. Ludwig, 1928; M. Muret, 1940; J. von Kührenberg, 1954.

William le Clito, *see* ROBERT II.

William of Auvergne (c. 1180–1249), Fr. scholar and theologian, b. Aurillac. He became Bishop of Paris. He was a prominent schoolman, and was one of the first to attempt a synthesis of Aristotelianism and Christianity. *See* study by C. Werner, 1873.

William of Champeaux (c. 1070–1121), Fr. philosopher, b. Champeaux. He was one of the founders of scholastic realism. He set up a school of logic in Paris, which was attended by Abelard (q.v.), his future rival. In 1113 he became Bishop of Châlons-sur-Marne.

William of Durham, *see under* UNIVERSITY COLLEGE (Oxford).

William of Jumièges, *see* JUMIÈGES.

William of Malmesbury (c. 1095–1143), Anglo-Norman chronicler. He became a monk in the monastery at Malmesbury and inter-librarian and precentor. His *De Gestis Regum Anglorum* (AD 449–1127), gives the hist. of the kings of England from the Saxon invasion to 1127. He also wrote *De Gestis Pontificum Anglorum*, 1125 (revised 1135–40); *De Antiquitate Glastoniensis Ecclesiae*, an account of the church of Glastonbury; *Historiae Norwiche* (a sequel to the *De Gestis Regum*); and a *Life of St Dunstan*. M. gives a careful record of contemporary events at the Council of Winchester against Stephen in 1141. Master of a vivid and elegant style, he enhanced the interest of his narrative by introducing lively anecdote and pictorial description. But his particular merit was to substitute, for a laborious chronological presentation of events, a story illustrated by many agreeable digressions, which brings out the significance and inter-relation of incidents as he conceived them.

William of Newburgh, or **Newbury** (1136–c. 1198), historian, who wrote his *Historia Rerum Anglicarum* towards the end of the 12th cent. His hist. begins in the year of the Conquest and extends to his own time. W. was a monk of the Augustinian priory at Newburgh in Yorks.

William of Ockham, *see* OCKHAM, WILLIAM OF.

William of Orange: (1533–84), *see* WILLIAM THE SILENT; (1650–1702), *see* WILLIAM III.

William of St Calais (d. 1096), Norman prelate. He came to England with the Conqueror, and was made Bishop of Durham in 1081. The rebuilding of Durham Cathedral (*see further under* DURHAM) in its lasting form was begun in 1092 by W.

William of Tyre (c. 1130–c. 1186), Fr. prelate and chronicler. He was appointed archdeacon of Tyre at the request of Amalric, King of Jerusalem, in 1167, and was consecrated Archbishop of Tyre in 1175. W. was among the foremost of medieval historians, his chief work, *Historia Rerum in Partibus Transmarinis Gestarum*, being one of the main authorities for events in the Lat. kingdom of the E. in the 12th cent. In it all topics, archaeological, political, eccles., social, and topographical are treated, though fault has been found with its chronology.

William of Wied, Prince, *see under* ALBANIA.

William of Wykeham, *see* WYKEHAM.

William the Lion (1143–1214), King of Scotland. He succeeded his brother, Malcolm IV, in 1165. W. made an alliance with France against England in 1168. In 1174 he invaded England in alliance with Henry's own sons, was defeated at Alnwick, and sent as a prisoner to Falaise in Normandy. By the treaty of Falaise he was liberated, but he agreed to do homage to Henry for Scotland and all his other terts. By the treaty of Canterbury (1189) between him and Richard I the independence of Scotland was recognised on payment of 10,000 marks. During his reign the Church in Scotland strongly asserted its independence of the Church in England.

William the Silent, Prince of Orange (1533–84), soldier, statesman, and founder of the Dutch rep., the eldest son of Wm, count of Nassau, was b. at Dillenburg in Nassau. In 1544 he succeeded a cousin in the principality of Orange and estates in Flanders and Holland, and before he was 21 Charles V appointed him general-in-chief of the Army and stadtholder of Holland, Utrecht, and Zeeland. In 1567 he was head of the national rising against Sp. persecution, and openly embraced Protestantism. He was at first defeated by Alva, largely through want of means, but in 1579 he estab. the union of the 7 northern provs. He was assassinated by Balthazar Gérard, an agent of Philip II. *See* J. L. Motley, *Rise of the Dutch Republic*, 1856 (reprinted in Everyman's Library); *Cambridge Modern History* (vol. III, 1904). *See also* lives by F. Harrison, 1897; Ruth Putnam, 1911; and C. V. Wedgwood, 1944.

Williams, Arthur Frederick Basil (1867–1950), historian, b. London and educ. at Marlborough and at New College, Oxford. In 1921 he was Ford Lecturer at Oxford and held the chairs of hist. from 1921 to 1925 at McGill Univ., Montreal, and from 1925 to 1927 at Edinburgh Univ. An Eng. historian of distinction, W. will be

remembered especially for his monumental, well-documented, 2-vol. biography of Chatham, *The Life of William Pitt, Earl of Chatham*, 1913, a standard work, his equally well documented life of *Stanhope*, 1932; and also for his later works, *Cecil Rhodes*, 1921, and *Cartier and Newcastle*, 1943.

Williams, Emlyn (1905-), actor, dramatist, and producer, b. Penryffordd, Flintshire; educ. Holywell County School, Switzerland, and Christ Church, Oxford, he was originally intended for a schoolmaster. He became a member of the O.U.D.S. and made his first appearance on the stage at the Savoy Theatre, 1927, in *And So To Bed*. His first big success as actor-dramatist was with his play *Night Must Fall* at the Duchess Theatre, which ran for over a year. This play thrilled its audience in an uncanny way, and his own performance therein stamped him as an actor of outstanding power. He also played it at the Barrymore Theatre, New York. Among subsequent successes in his own plays were *The Corn is Green*, 1938, *The Light of Heart*, 1946, *The Wind of Heaven*, 1945, *Trespass*, 1947, *Accolade*, 1950, and *Someone Waiting*, 1953. He made a very great success as 'Charles Dickens' in readings from Dickens' works, a solo performance of immense virtuosity in which he toured the world, and which was paralleled by his readings from Dylan Thomas. *The Corn is Green* gained the New York Drama Critics Circle Award for the best foreign play in 1941. He produced his own play *Beth* in 1958.

Williams, Sir George (1821-1905), see YOUNG MEN'S CHRISTIAN ASSOCIATION.

Williams, John (1796-1839), missionary, b. High Cross, Tottenham. In 1816 he offered himself to the Missionary Society (now London Missionary Society) and was appointed to the S. Seas. He was given charge of the is. of Raiatea in the Society Group, but his restless activity led him to explore further Polynesian is. He voyaged among the Cook Is. Stranded on the is. of Rarotonga, he built *Messenger of Peace*, in which he explored the S. Seas for 10 years, opening up the Samoan is. to Christian missions. In Nov. 1839 he left to visit the cannibalistic New Hebrides, and on the is. of Erromanga he was murdered. See life by B. Mathews, 1935.

Williams, Ralph Vaughan, see VAUGHAN WILLIAMS.

Williams, Roger (c. 1600-83), founder of Rhode Is., U.S.A., b. (probably) London, and educ. at the Charterhouse and Pembroke College, Cambridge. He took orders, but became a Puritan, and in 1631 sailed for the New World in search of religious freedom. He preached at Salem (1631 and 1634) and at Plymouth (1631-3), and in 1636 founded the city of Providence, where all believing in religious freedom might live. Here, too, he estab. the Baptist church. He was president of Rhode Is. 1654-7, and pub. many religious works. W.'s importance lies in his belief in toleration for all opinions.

Williams, Tennessee (1912-), Amer. playwright, b. Columbus, Mississippi, his original name being Thomas Lanier Williams. Educ. at the univs. of Missouri and Iowa, he was employed for a time by one of the film companies in Hollywood, where he wrote *The Glass Menagerie*, 1945. This play, together with *A Streetcar Named Desire*, 1947, estab. him as one of America's leading dramatists. Later plays are *Summer and Smoke*, 1948, *The Rose Tattoo*, 1951, *Camino Real*, 1953, and *Cat on a Hot Tin Roof*, 1955. 27 *Wagons Full of Cotton*, 1946, is a collection of one-act plays, and *One Arm*, 1948, and *Hard Candy*, 1954, are vols. of short stories.

Williams, William Carlos (1883-), Amer. poet and novelist, b. Rutherford, New Jersey. He was educ. at Geneva and the univ. of Pennsylvania, where he studied medicine. As a poet he set himself to develop a distinctive Amer. technique which would be non-derivative. His vols. of verse include *Poems*, 1909, *The Tempers*, 1913, *Al Que Quere*, 1917, *Kora in Hell*, 1920, *Sour Grapes*, 1921, *Spring and All*, 1922, *Adam and Eve and the City*, 1936, *Broken Span*, 1941, *The Wedge*, 1944, and his 'personal epic,' *Paterson*, 1946-51, which received the National Book Award. He wrote 3 novels which form a trilogy, *White Mule*, 1937, *In the Money*, 1940, and *The Build-Up*, 1952. He also pub. 2 books of critical essays, *The Great American Novel*, 1923, and *In the American Grain*, 1925, and an *Autobiography*, 1951. See study by V. Koch, 1950.

Williamsburg, city in, but independent of, James City co., Virginia, U.S.A., 45 m. SE. of Richmond; it contains the Wm and Mary College (1693) and E. State Lunatic Asylum (1769). It was the first cap. of Virginia. Through the munificence of J. D. Rockefeller, Jr., it has been uniquely restored to its former condition of 300 years ago, and is included in Colonial National Historical Park. Pop. 6735. See W. Tyler, *The Old Colonial Capital*, 1909.

Williamson, Henry (1897-), novelist and nature writer, b. Beds. He first came into prominence through his tetralogy, *The Flax of Dreams*, made up of *The Beautiful Years*, 1921, *Dandelion Days*, 1922, *Dream of Fair Women*, 1924, and *The Pathway*, 1928. But he is best known for his animal stories, such as *Tarka the Otter*, 1927, which was awarded the Hawthornden Prize, *The Old Stag*, 1926, *Salar the Salmon*, 1935, and *Tales of Moorland and Estuary*, 1953. *Life in a Devon Village*, 1932, is partly autobiographical.

Williamsport, city and co. seat of Lycoming co., Pennsylvania, U.S.A. It is a well-built and imposing tn, standing in pleasant country 75 m. WSW. of Scranton. It has manufs. of motors, steel and iron goods, aircraft parts, wood, wire, and electrical products, leather, furniture, and textiles. It is the seat of Lycoming College. Pop. 45,000.

Williamstown, city of Victoria, Australia, on the shore of Hobson's Bay. The

distance from Melbourne by rail is 9½ m., but a steam ferry across the R. Yarra reduces the distance to 4½ m. W. is the centre of a busy dock area and the site of engineering and other factories. Pop. (estimated) 27,000.

Willibald, or **Willebald**, St (d. c. 700-738), Eng. missionary, b. Wessex, a cousin of St Boniface. He was offered as an oblate at Waltham abbey at the age of 5, and afterwards took vows in that monastery. Later he went on pilgrimage to Rome and Palestine, and studied at Monte Cassino. He was sent to Germany by the Pope to help St Boniface, and by the latter was consecrated Bishop of Eichstätt. W. was canonised in 938; his feast is on 7 July.

Willibrord (or **Willebrod**), St (c. 658-739), Eng. Benedictine monk of Ripon, b. Northumbria. After being trained in Ireland for the missionary life, he sailed with 11 companions to Friesland (c. 690). Consecrated bishop 6 years later, he estab. his see at Utrecht, and founded the monastery of Echternach, in Luxemburg, where he d. He is regarded as the apostle of the Netherlands; his feast is on 7 Nov.

Willington, **Freeman Freeman-Thomas**, first Marquess of (1866-1941), administrator, educ. at Eton and Trinity College, Cambridge. He entered Parliament as Liberal member for Hastings in 1900; for Bodmin in 1906. He was junior lord of the Treasury from 1905 to 1912 and was raised to the peerage in 1910. W. received the G.C.S.I. in 1924 and was raised to a viscounty. He succeeded Lord Byng as governor-general of Canada, 1926. He received G.C.M.G., 1928, and succeeded Lord Irwin as viceroy of India in 1931. During his first year of office he induced Gandhi to visit London for the Second Round Table Conference (see *INDIA—History*), and dealt firmly with the civil disobedience movement, 1932-4. He was created marquess in 1936, when he relinquished his viceroyalty.

Willington, see **CROOK**.

Wills, **Thomas** (1821-75), physician, b. Great Bedwin, Wilts, and educ. at Oxford Univ., graduating B.A., 1839. He was a Royalist and served in the King's army. He qualified in medicine in 1846 and practised in Oxford. In 1860, shortly after the Restoration, he was appointed Sedleian prof. of natural philosophy, and in the same year was M.D. He was one of the early fellows of the Royal Society and was elected an honorary fellow of the Royal College of Physicians in 1864. W. removed to London in 1866, where his reputation assured him of a lucrative practice. He was also physician to James II. His *Cerebri Anatome*, 1664, was the most complete and accurate account of the nervous system which had hitherto appeared. W. was a remarkably observant clinician; he was first to note the characteristic sweet taste of diabetic urine, he described whooping cough, myasthenia gravis, and hysteria, gave the first account of epidemic typhoid and epidemic cerebrospinal fever, was first to

describe and name puerperal fever, and introduced the modern treatment of asthma. Besides the *Cerebri*, he wrote *Pathologiae Cerebri*, 1687, *De Anima Brutorum*, 1672, *Pharmacoeutice Rationales*, 1674-5, and *Practice of Physick*, 1684. His *Opera Omnia* appeared in 2 vols., 1678-80. W. was buried in Westminster Abbey.

Wills's Rooms, see **CLUB**.

Willkie, **Wendell** (1892-1944), Amer. politician, lawyer, and businessman, b. Elwood, Indiana, of Ger. stock. He was educ. at a local school in Elwood and, afterwards, at Indiana Univ.; studied law at Oberlin College. He was called to the Ohio Bar 1914. In 1923 he became a member of the Bar of New York City, and in 1933 was appointed president of the Commonwealth and Southern Corporation. W. embarked on a long struggle against Roosevelt's New Deal policy, notably in relation to the Tennessee Valley Authority (q.v.). In 1940 he was the Republican candidate for the presidency of the U.S.A., when Roosevelt was elected for his third term. However, he later served as Roosevelt's personal representative abroad, and at home took a leading part in the attempt to liberalise the Republican party.

He consistently supported Great Britain and encouraged the Amer. war effort. He visited England in 1941, and on his return gave evidence in favour of the Lend-Lease Bill, and urged the repeal of the Neutrality Act. In Aug. 1942 he set out for the Near E., Russia, and China, as a special representative of the U.S.A., appointed by Roosevelt. His book, *One World*, appeared in 1943.

Will-o'-the-Wisp, see **IGNIS FATUUS**.

Willoughby, de **Eresby**, see **BERTIE**.

Willoughby, metropolitan municipality of Sydney in Cumberland co., New S. Wales, Australia. Pop. 52,240.

Willow, see **SALIX**.

Willow Herb, **French Willow**, or **Rose-bay**, see **EPILOBIUM**.

Willow Pattern, a design in the pseudo-Chinese style for underglaze blue transfer-printing on Eng. pottery and porcelain. The type was introduced by Thomas Turner (1749-1809), the proprietor of the Caughley pottery near Broseley, Shropshire, about 1775-80, and is said to have been engraved by Thomas Minton (q.v.). It was greatly copied at many other Eng. factories. The legend attached to the scene is apparently of Eng. and not of Chinese origin. Chinese porcelain examples are later than the Eng., from which they were copied.

Willow Run, residential and industrial suburb in Washtenaw co., SE. Michigan, U.S.A. Automobiles and farm machinery are made in the huge W. R. plant, which produced bombers during the Second World War. The Univ. of Michigan has an aeronautical research centre at the airport here. Pop. 11,365.

Willow Wren, see **WARBLERS**.

Wills and Testaments. A will or testament is a declaration in which its maker, the testator (q.v.), directs the manner in which his assets shall be distributed after

his death. With certain exceptions, only persons under 21 or of unsound mind are unable to make a valid will.

The will or codicil (q.v.) of a testator domiciled in England or Wales must (Wills Act, 1837), with the exceptions mentioned later, be written, be signed at the end by him or some other person at his direction and in his presence, and such signature must be either made or acknowledged by him in the presence of 2 witnesses who, being present at the same time, must sign the will in his presence. A document executed in this manner described as instructions for a will may have effect as such, if it is apparent that it was intended to operate in the absence of a more formal instrument. A will is always revocable, even though the testator may expressly declare it to be irrevocable. It may be revoked by a subsequent will or codicil; or by a written declaration of an intention to revoke, executed like a will; or by destruction by burning, tearing, cancellation, etc., provided that such destruction was intended as a revocation. A will, unless expressed to be made in contemplation of marriage, is automatically revoked by the subsequent marriage of the testator (wills made in exercise of a power of appointment are not so revoked). A revoked will can be revived only if it is re-executed or by a codicil showing an intention to revive it. By Lord Kingsdown's Act, no will or testament is revoked, made invalid, or its construction altered because the testator subsequently changes his domicile. Any alteration in a will, made after its execution, must itself be executed in the same way as a will, or the testator and his witnesses must sign their names in a position close to the alteration or in a signed memorandum at the end of the will referring to the alteration. Alterations not so executed will be ineffective, although they can be validated by a codicil confirming the will (*see also* EVIDENCE). A will can be witnessed by anyone not totally blind or mentally deficient. Executors or creditors may witness a will. If a beneficiary or the spouse of a beneficiary under a will witnesses it, the will is valid but the bequest is void.

By virtue of the Wills Act, 1837, and the Wills (Soldiers and Sailors) Act, 1918, in certain circumstances the wills of members of the Armed Forces and mercantile marine need not comply with the formalities required to validate a civilian's will. Such wills need not be signed, witnessed, or even written, and can be made by persons under 21. This privilege applies to any soldier or airman being in actual military service or any seaman or mariner at sea or to any member of Her Majesty's naval or marine forces, not only when at sea but also when he is so circumstanced that, if he were a soldier, he would be 'in actual military service.' A 'soldier's' will, even if not in legal form or made by a testator under 21, can validly dispose of real (q.v.) or personal property (q.v.). Members of

women's services, a nurse in a hospital ship, and a seaman-typist are among those whose wills have been held to be entitled to exemption from the usual legal formalities.

Unless a will expresses a contrary intention, it disposes only of property owned at the testator's death. Thus, if a testator makes a will in 1958 bequeathing a ring to X, but later sells it, the bequest lapses. On the other hand, the testator might indicate in his will that if at the time of his death he had sold the particular ring, another ring should be bought for X out of the testator's estate. A person may validly dispose of any property acquired subsequently to the making of his will. Where a beneficiary under a will predeceases the testator, the gift lapses except in certain cases (*see* LAPSE).

A bequest or devise to 2 or more persons by name or by a general description of them as a class (e.g. 'the nephews of X') is construed as a joint gift (*see also* JOINT TENANCY), and where any of the joint beneficiaries predecease the testator their shares go to the surviving joint beneficiaries. If, however, the testator uses words implying separate interests (e.g. 'equally' or 'among'), the beneficiaries will take 'in common' (*see* COMMON, TENANCY IN). But a gift to a class, even though as tenants in common, e.g. a bequest of '£10,000 to the children of X in equal shares,' will be construed as a gift to such of the children of X as shall be living at the death of the testator, and the predecease of any one of them does not cause a lapse.

A testator's right to dispose of his property may be curtailed by the High Court's power under the Inheritance (Family Provisions) Act, 1938, as amended by the Intestates' Estates Act, 1952, to protect his needy dependants from the effects of a capricious or vindictive will which makes them no 'reasonable provision' out of his estate. The term 'dependants' includes: (1) a surviving spouse; (2) an infant son; (3) an incapacitated son; (4) an unmarried daughter; (5) an incapacitated daughter. Such dependants may apply to the Court for an order for maintenance to be paid to them out of the testator's estate. Maintenance from an estate of less than £5000 may be payable by a lump sum. Where the net estate exceeds that sum, dependants may receive only 'periodical payments' out of income. No order for maintenance can be made if the only 'dependants' are a surviving spouse and her children and she is already entitled to two-thirds of the income. Since 1953, 'dependants' may also obtain maintenance if the deceased died completely intestate (*see* SUCCESSION, INTESTATE). Applications for maintenance must be made within 6 months of the grant of probate or letters of administration (q.v.), although the time limit may be extended in certain circumstances (e.g. where a new will or codicil is found after probate).

Though a will is not required by law to be made in any particular form, more

or less common forms have been evolved in process of time. The Law of Property Act, 1925, provides that the Lord Chancellor may prescribe forms to which a testator may refer in his will, but that unless so referred to, such forms are not to be deemed incorporated in a will. Such an Order has already been made under that provision (Statutory Will Forms, 1925; Statutory Rules and Orders, 1925, No. 780).

Scots Law of Wills. A domiciled Scotsman cannot, in certain circumstances, dispose of the entirety of his estate. If he leave a widow and children, the widow is entitled to one-third share in the whole of the moveable estate (see *JUS RELICTAE*), and the children to another third (see *LEGITIM*). If he leave a widow but no children, or children but no widow, these shares are increased to one-half of the estate. The remaining portion is known as the dead's part (q.v.). The widow is also entitled to *terre*, i.e. a life rent in one-third of her husband's heritable property. A surviving husband and children have comparable rights in the wife's estate. The dead's part is the only portion of which the testator can freely dispose. A pupil cannot make a valid will. A minor may dispose of moveables without the consent of any other person, but, unless he is a member of the forces, he cannot dispose of heritage. Wills must be in writing (except that a person may leave a legacy verbally if the amount does not exceed £8 6s. 8d. sterling). They may be either *holograph* (q.v.), in which case no witnesses are necessary; or *testad*, i.e. signed in the presence of 2 witnesses. It is not necessary that these witnesses should sign in the presence of one another or even that they should see the testator signing, so long as the latter acknowledges his signature to the witnesses. It is better that the will be not witnessed by a beneficiary, but if it is, that fact will not invalidate the attestation or the gift. A Scottish will is not revoked by the subsequent marriage of the testator. The subsequent birth of a child, for whom no testamentary provision has been made, may revoke a will in whole or in part. A will is revoked by a later will either expressly or by implication, but in so far as the deeds can be read together, both will have effect. 'Confirmation,' the Scottish equivalent of probate, is obtained in the Sheriff Court of the county in which the testator was domiciled at the time of his death or, where he had no fixed domicile, in the commissariat of Edinburgh.

The Wills Act, 1837, does not apply to Scotland; it is not clear whether the Wills (Soldiers and Sailors) Act, 1918 (which amends the 1837 Act), applies to Scotland or not.

By the common law of Scotland, a Scottish soldier, sailor, or airman, like any other domiciled Scot, can make a valid will without having it witnessed, provided that it is written, or that the essential parts of it are written, in his own hand.

In the U.S.A. the general age of testa-

mentary capacity is 18. By the constitutions of many states laws giving effect to informal or invalid wills are forbidden. In some states children cannot be disinherited without good cause. Holograph wills are in use. Two witnesses are necessary and, as in England, wills of members of the Armed Forces are privileged.

See also CODICIL; EXECUTOR; HOLOGRAPH; PROBATE.

See T. Jarman, *Treatise on Wills* (8th ed.), 1951; S. J. Bailey, *Law of Wills* (4th ed.), 1953; Sir H. S. Theobald, *On the Law of Wills* (11th ed.), 1954.

Will's Coffee House, see COFFEE-HOUSES.

Willneck, see QUANTOCK HILLS.

Willstätter, Richard (1872-), Ger. chemist. He was prof. in Berlin and Munich and investigated alkaloids and their derivatives, e.g. atropine and cocaine. Did work on betaine, lecithin, quinones and their derivatives, chlorophyll, enzymes, and the colouring matter of flowers. He prepared the first anthocyanin (q.v.) (cyanin from cornflower) in a state of purity, and was the first to prepare *cyclo-octatetraene*. Concerned with the syntheses of aromatic compounds from aliphatic ones, e.g. the conversion of cyclohexanol to cyclohexene, thence to cyclohexadiene and finally to benzene. Contributed to knowledge of the modern electronic theory of organic chemistry by his work on conjugation.

Willughby, Francis (1635-72), ornithologist and ichthyologist, son of Sir Francis W. He was educ. at Cambridge and Oxford Univs. He was a fellow pupil and, later, patron, of John Ray (q.v.), with whom he made an extensive continental tour, accumulating specimens and notes which were subsequently elaborated into his *Ornithologia* (pub. posthumously) (1676), trans. by Ray as the *Ornithology of Francis Willughby*, 1678. Ray also pub. W.'s *Historia Piscium*, 1686. In Ray's preface to the first-named work he gives W. most of the credit commonly assigned to himself both as critic and systematist.

'Willy-willy,' see TORNADO.

Wilmoote, vil. of Warwickshire, England, $\frac{3}{4}$ m. W. of Stratford-upon-Avon, where Mary Arden's House, home of Shakespeare's mother, may be visited.

Wilmotte, residential vil. in NE. Illinois, U.S.A., suburb of Chicago on Lake Michigan, N. of Evanston. W. is the seat of a Baháist temple and Mallinckrodt College. Pop. 18,200.

Wilmington: 1. Vil. of Sussex, England, 6 m. from Eastbourne. Near it is the 'Long Man of Wilmington' (see WHITE HORSES AND HILL-FIGURES). There are also the ruins of a Benedictine priory.

2. Co. seat of New Castle co., Delaware, U.S.A., on the Delaware R., 25 m. SW. of Philadelphia. Among its notable buildings is the Old Swedes Church (1698). Its manufs. include chemicals, leather, iron and steel products, cork, rubber, and textile goods, paper, machinery, and railroad cars. Oil refining and automobile

assembly are also carried on. W. is the seat of Delaware Academy of Medicine, and has an art centre. It is a deep-water port, with a municipal marine terminal and docks along the Christina R. Pop. 110,355.

3. Co. seat of New Hanover co., N. Carolina, U.S.A., on the Cape Fear R. 30 m. from the sea. It is a railroad and manufacturing centre with cotton-seed oil mills, naval stores, dye works, and lumber mills. It also has clothing, textile, fertiliser, metal, creosoting, shipbuilding, and meat-packing industries; centre for petroleum products and chief port of entry of N. Carolina. Pop. 46,043.

Wilmslow, urb. dist. of Cheshire, England, 6 m. SE. of Stockport and 177 m. from London. It is a residential dist. Pop. 18,870.

Wilno, see VILNIUS.

Wilrijk, S. suburb of Antwerp, Belgium. Pop. (1955) 29,900.

Wilson, Charles Thomson Rees (1869-), physicist, b. Glencorse, Midlothian, and educ. at Owens College, Manchester, and Sidney Sussex College, Cambridge, of which he was Fellow. Prof. at Cambridge, 1925-34. He did research on condensation nuclei, ions, and atmospheric electricity (see WILSON CLOUD CHAMBER). He won the Nobel Prize for physics in 1927.

Wilson, Edmund (1895-), Amer. critic and novelist, b. Red Bank, New Jersey. Educ. at Princeton, he became a reporter, in 1920 was appointed editor of *Vanity Fair*, and from 1944 to 1948 was book reviewer for the *New Yorker*. One of the leading critics of his time, he pub. *Azel's Castle*, 1931, a study of the Symbolist movement, and *To The Finland Station*, 1940, a history of revolutionary traditions. Others of his books are *The American Jitters*, 1932, *Travels in Two Democracies*, 1936, *The Triple Thinkers*, 1938, *The Wound and the Bow*, 1941, *The Boys in the Back Room*, 1941, *Memoirs of Hecate County*, 1946, *Classics and Commercial: A Literary Chronicle of the Forties*, 1950, and *The Scrolls from the Dead Sea*, 1955. He also wrote sev. plays, including *This Room and This Gin and These Sandwiches*, 1937, and *Little Blue Light*, 1951. *I Thought of Daisy*, 1929, is a novel.

Wilson, Edward (1872-1912), explorer, scientist, and artist. Member of Scott's (q.v.) Antarctic expeditions of 1901-3 and 1910-13. His water-colours of Antarctic scenes are well known. He d. on the return from the Pole. See G. Seaver, *Edward Wilson of the Antarctic*, 1933, *Edward Wilson, nature-lover*, 1937.

Wilson, Florence Roma Muir (1891-1930), novelist who wrote under the name Romer Wilson, b. Sheffield. She studied law at Girton College, Cambridge, and in 1923 married Edward J. H. O'Brien, an Amer. anthropologist. Her first novel, *Martin Schuler*, appeared in 1918, and in 1921 she won the Hawthornden Prize with *The Death of Society*. Later novels are *The Grand Tour*, 1923, *Dragon's Blood*, 1926, *Later Day Symphony*, 1927, *Greenlow*, 1927, *The Hill of Cloves*, 1929,

and *Tender Advice*, 1936. *The Social Climbers*, 1927, is a play, and *All Alone*, 1928, is a life of Emily Brontë. She also pub. 3 vols. of fairy stories.

Wilson, Henry Maitland, 1st Baron (1881-), Brit. soldier, educ. at Eton and Sandhurst. He served in the South African War and First World War. From 1927-30 he commanded 1st Battalion the Rifle Brigade. In 1935 he became a major-general, and from 1937-39 commanded the 2nd Division at Aldershot. A lieutenant-general in 1939, general in 1941, and field-marshal in 1944, his commands during the Second World War comprised G.O.C.-in-C. in Egypt, 1939; in Cyrenaica, in Greece, and in Palestine and Transjordan, 1941; commander-in-chief Allied forces in Syria, and G.O.C. 9th Army, 1941; commander-in-chief Persia and Iraq, 1942-3; Middle East, 1943; and Supreme Commander, Mediterranean, 1944. He was raised to the peerage in 1946. See his *Eight Years Overseas*, 1950.

Wilson, (James) Harold (1916-), politician, educ. at council schools, Wirral Grammar School, and Jesus College, Cambridge. He had a brilliant academic career and became a lecturer in economics at Oxford Univ. Since 1945 he has been a Labour M.P. He held a number of junior posts in the Labour Govs. of 1945-51 before being made President of the Board of Trade, 1947. In this position, and, subsequently, as one of the prin. members of the Opposition, he became known as an expert on economic affairs, and has had great influence on Socialist economic policies. Since 1955 W. has done much to reorganise the national organisation of his party in readiness for the next General Election.

Wilson, John (1785-1854), poet and essayist who wrote under the pseudonym Christopher North, b. Paisley. He was educ. at Paisley Grammar School, Glasgow Univ., and Magdalen College, Oxford, where he won the Newdigate Prize for Poetry. In 1820 he became prof. of moral philosophy at Edinburgh, where he had a most stimulating influence on the students. He pub. 2 poems, *The Isle of Palms*, 1812, and *The City of the Plague*, 1816, but is best known for his *Noctes Ambrosianae*, 1822-35, a series of miscellaneous essays appearing first in *Blackwood's Magazine*, to which he was a contributor from its foundation in 1817. Works of fiction are *Lights and Shadows of Scottish Life*, 1822, and *The Trials of Margaret Lindsay*, 1823. See lives by M. Gordon, 1862, and E. Swann, 1934.

Wilson, John (1804-75), missionary and orientalist, b. Lauder, Berwick, and educ. at Edinburgh for the ministry of the Church of Scotland. He went to India in 1828 as a missionary, and became a leader in social reform, such as the abolition of the slave trade and suttee. He was a profound oriental scholar. Vice-chancellor of Bombay Univ.; wrote *The Parsi Religion*, 1843, *Lands of the Bible*, 1847, *India Three Thousand Years Ago* 1858.

Wilson, Richard (1714-82), painter, b. Penegoes, Montgomeryshire. He studied art in London and afterwards in Italy. His pictures were little in demand during his lifetime, and it was not till many years after his death that he became recognised as the first great Eng. master of landscape painting. When he went to Italy (1750), W.'s intention was to improve his portrait painting, but on the advice of Claude Vernet (q.v.) he decided to abandon it for landscape. The prin. sources of his inspiration during his 5 years' stay in Italy were the 17th-cent. Fr. masters Claude Lorraine and Gaspard Poussin. He returned to England in 1757, and for the rest of his life continued to paint many It. subjects. He found inspiration in the Welsh mts, and his 'Cader Idris' is one of his best works. He also painted a number of views of country mansions, in which predominance was given to the picturesque setting rather than to architectural considerations. Among the best are 'Croome Court, Worcestershire' and 'Tabley House, Cheshire.' See A. Bury, *Richard Wilson, R.A., The Grand Classic*, 1948.

Wilson, Romer, see WILSON, FLORENCE.

Wilson, (Thomas) Woodrow (1856-1924), twenty-eighth President of the U.S.A., b. Staunton, Virginia, of Scots-Irish descent. W. spent the early and formative years of his life in Georgia and S. Carolina, and so saw something of reconstruction in the S. after the Civil war. He graduated from Princeton, and then graduated in law from the univ. of Virginia, practised for a short time at Atlanta, and then went to Johns Hopkins Univ., where he obtained his Ph.D. in 1886. From 1886 to 1888 he was associate prof. of hist. and political economy at Bryn Mawr College, and from 1888 to 1890 held the same post at Wesleyan Univ. In 1890 he returned to Princeton Univ. as prof. of jurisprudence and political economy, and in 1902 became President of Princeton. In 1910 W. was elected Democratic governor of New Jersey and succeeded in effecting many reforms. These made him a prominent public figure, and in 1912, after a sharp contest, W. was nominated Democratic candidate for the presidency. The Republican vote was split, which resulted in W. being overwhelmingly elected. The Democrats had also the control of both Houses of Congress. In his inaugural address the new President outlined a vigorous policy of reform. The prin. Acts of his administration were the Underwood Tariff Bill, the Federal Reserve Act, the Clayton Anti-Trust Act, which gave organised labour its charter of freedom, and the repeal of the Panama Canal Tolls Act. Few administrations in Amer. hist. could point to finer domestic accomplishments. But W. was less fortunate in his foreign policies, and for a time war with factions in Mexico seemed imminent. But greater events turned the country's attention elsewhere, and when the First World War broke out it was the fixed policy of the country to remain free from entangling alliances and

European wars. All that W. was called upon to do was to issue the neutrality proclamation usual in such crises. W. pursued this policy with determination, hoping that, after a time, the U.S.A. might act as mediator to end the conflict. (See further under WORLD WAR, FIRST.)



U.S. Information Service,
American Embassy

WOODROW WILSON

At the election of 1916 W. was re-elected. His 'peace without victory' address on 22 Jan. 1917 was his last effort to bring the war to an end by peaceful methods. On 2 April 1917 W. asked Congress to declare war on Germany and her allies. For details of the U.S.A.'s actions during the war see WORLD WAR, FIRST; U.S.A. (HISTORY). When the war was ended and the peace conference was to meet at Versailles, W. announced that he would himself lead the Amer. delegation. With Lord Robert Cecil and others he drew up the Covenant of the League of Nations. He returned to America early in 1919 with the draft of the Covenant. He found a hostile and factious Senate controlled by the Republicans. In July 1919 he at once declared that the text of the peace-treaty and the Covenant of the League of Nations were inter-dependent and that one could not be adopted without the other. W. prepared to appeal to the people over the heads of the Senate, and undertook a national speech-making tour. He had a mainly cool reception, and in Sept. he had a serious breakdown. Unable to fight, W. nevertheless intimated that he

would accept a mild reservation to Article Ten of the Covenant. But as reported and voted on in Mar. 1920 it contained stronger reservations than he had been willing to accept. As the controversy went on, the bulk of the people veered into opposition, because of traditional feeling that the U.S.A. should in no way be entangled in foreign alliances or undertakings. The election of 1920 resulted in an overwhelming victory for Harding, the Republican, against Cox, the Democratic candidate. Some consolation came to W. when he was awarded the Nobel peace prize for 1919.

W.'s place in hist. is secure, though his actions and beliefs are still the subject of controversy. He never achieved the kind of popularity his great opponent, Theodore Roosevelt, enjoyed: he had none of Roosevelt's expansiveness and robust vitality, and struck many as cold and aloof. But he was keenly aware of the suffering and fears of ordinary people. He saw beyond the boundaries of his own country and gave inspiration to the ideal of international gov. He failed because he was not enough of a politician to appreciate in his enthusiasm that his own country and most others were not ready to acknowledge his solution. He was the author of a number of books on history and law, including *A History of the American People* (5 vols.), 1902, and *Constitutional Government in the United States*, 1908. See lives by R. S. Baker, 1927-35; W. A. White, 1925; W. E. Dodd, 1932; W. S. Myers, 1947. See also T. A. Bailey, *Woodrow Wilson and the Great Betrayal*, 1945; E. M. Hugh Jones, *Woodrow Wilson and American Liberalism*, 1947; A. S. Link, *Wilson, The Road to the White House*, 1947.

Wilson Cloud Chamber. When fast-moving charged particles, such as α -particles, pass through a gas, they eject electrons from the atoms that they encounter. The result is a large number of ionised atoms which, however, unite very soon with the ejected electrons and return to their normal state. If some means could be devised to make the ions visible, or alternatively, to make visible some condensation on these ions, the tracks of the α -particle would be made visible. While it is impossible to see the ions themselves, it is possible to see a condensation on them by means of the W. C. C., the principle of which is as follows. It is well known that water vapour condenses on small nuclei, such as fine dust or soot in the atmosphere, and ions can play the same part as these particles. If there is a fall in the pressure and a lowering of the temp. in the atmosphere, condensation takes place more easily, and an artificial method for producing favourable conditions for the precipitation of water vapour on ions is accomplished by the C. C. In its simplest form it consists of a metallic cylinder with a glass cover, the other end being closed by a piston which can be moved up and down to change the pressure. The gas or air between the glass cover and the piston is saturated with water vapour,

and a movement of the piston causes an adiabatic expansion rapid enough to cool the gas. Precipitation in the form of very fine drops of water takes place on the ions formed by an α -particle (e.g.), and as these are illuminated by a strong light through a side window, they can be observed and photographed stereoscopically. This simple piece of apparatus first constructed in 1911 has provided most valuable information on the results of nuclear bombardment. It led to the identification of the positron (q.v.) in 1932, and has been used for the study of mesons. By applying a magnetic field—the charged particle is caused to move along a curved track, the radius of which is given by mv/He , where m , v , and e are the mass, velocity, and charge of the particle. This also gives the sign of the charge, and in combination with measurements of the range of the particle, or the number of drops along the track, allows the particle mass to be found. See NUCLEUS; WILSON, C. T. R. See also G. D. Rochester and J. G. Wilson, *Cloud Chamber Photographs of the Cosmic Radiation*, 1952.

Wilton, mkrt tn and mun. bor. of Wilts, England, celebrated for its carpets since the time of Elizabeth I. It was the seat of a bishopric until 1075, and was the cap. of Wessex. Wilton House is the seat of the Earls of Pembroke. W. gave its name to the co. Pop. (estimated) 3054.

Wiltshire, SW. co. of England, bounded N. by Gloucestershire, S. by Dorset and Hants, E. by Hants and Berkshire, and W. by Gloucestershire and Somerset. The surface is for the most part hilly, and includes Salisbury Plain (20 m. by 16 m.) in the S., some 4000 ft above sea-level, with the N. Downs forming its N. border, and to the NE. the Marlborough Downs and Savernake Forest. The prin. rivs. are the Kennet, the Lower or Bristol Avon, the Salisbury Avon, and the Nadder. There are also the Thames and Severn canal, the Wilts and Berks canal, and the Kennet and Avon canal. W. is famous for its prehistoric monuments, of which Stonehenge and Avebury are the best known. Some 250 monuments are scheduled for protection. There are numerous eccles. ruins of later periods, including the abbey of Malmesbury and Lacock. At Edington the priory church is still intact. The Saxon church of St Lawrence at Bradford-on-Avon is also notable. Salisbury Cathedral (q.v.) is a fine example of the Early Eng. style, and many of the par. churches are of great interest. There are castle ruins at Old Sarum; at Marlborough and Devizes only the mounds are visible. At Wardour Castle, dating from the 18th cent., only the chapel retains its former splendour. Longleat and Wilton House are 2 of the great historic houses of England; at Stourhead the gardens are one of the finest examples of 18th-cent. landscape design.

Mixed farming is carried on, and a considerable area of the co. is under permanent pasture. Dairy-farming flour-

ishes, and there are condensed-milk manufs. Cheese and bacon are also produced. At Swindon there are railway locomotive works; at Devizes there are tobacco and snuff, and brewing industries; cloth and carpets are manuf. at Trowbridge, Wilton, and Bradford-on-Avon. Rubber is processed at Melksham and Bradford; gloving is carried on at Westbury; iron is found at Bath, and Portland stone is quarried. There are important engineering works at Chippenham. Other tns are Calne, Warminster, and Malmesbury. The chief tn is Salisbury, but Trowbridge is the centre for co. administration. The co. (including Swindon) returns 5 members to Parliament. Area 860,829 ac.; pop. 346,000. See Sir R. Colt Hoare, *History of Ancient Wiltshire*, 1811-12, and *History of Modern Wiltshire*, 1822; A. G. Bradley, *Round about Wiltshire*, 1907; F. Hutton, *Highways and Byways in Wiltshire*, 1917; H. W. Timperley, *Ridge Way Country*, 1935; A. Mee, *Wiltshire: Cradle of our Civilisation*, 1939; F. Olivier, *Wiltshire*, 1951 (County Books); books on W. by R. L. P. Jovitt (Batsford's Little Guides) and by R. Whitlock, both 1949.

Wiltshire Regiment (Duke of Edinburgh's), The, Eng. regiment, formerly the 62nd and 99th regiments. The 62nd was formed in 1756. The 62nd took part in the defence of Canada and in the Amer. War, 1776-7, fought in the Peninsula under Wellington, then went to the W. Indies and later to India, where it took part in the First Sikh war. It was also in the Crimea. The 99th was raised in 1824. It took part in the New Zealand campaign of 1846-7 and in the China war, 1860, and then went to S. Africa. The 66nd and 99th were linked in 1881 and served in the S. African war, 1899-1902. During the First World War the regiment raised 12 battalions which served in France, Flanders, Macedonia, Gallipoli, Palestine, and Mesopotamia. In the Second World War the regiment fought on the W. front, in the It. campaigns, and in Burma. It took part in the operations of the Second Army in Europe, notably in the heavy fighting of the Rhine operations of Mar. 1945. The Wiltshire and the Royal Berkshire Regiments are to be joined in 1959 to form the Duke of Edinburgh's Royal Regiment (Berkshire and Wiltshire).

Wimbledon, parl. and municipal bor. of Surrey, England. The ann. meetings of the National Rifle Association were formerly held on Wimbledon Common (1860-89). W. is the H.Q. of the All-England Lawn Tennis Club, where international championships for amateurs are held annually. It has interesting remains of an early Brit. earthwork. W. sends 1 member to Parliament. Pop. 58,300.

Wimborne Minster, mkt tn of Dorset, England, 6 m. N. of Poole; it is an agric. centre. The collegiate church or minster, dating from the Conquest, contains the tomb of Ethelred I and has a 14th-cent. clock. Near W. is Canford School, a public school for boys, founded in 1923. Pop. (estimated) 4488.

Wimereux, Fr. seaside resort in the dept. of Pas-de-Calais, 3 m. from Boulogne. It was badly damaged in the Second World War. Pop. 3000.

Wimshurst Machine, see ELECTRO-STATIC MACHINES.

Winant, John Gilbert (1889-1947), Amer. diplomat and politician, b. New York and educ. at St. Paul's School, Concord, and at Princeton Univ. In 1921 he was elected to the Senate as a Republican. In 1935 he was appointed assistant director of the International Labor Office, becoming its director in 1939. In 1941 Roosevelt appointed him ambas. to Great Britain. In 1943 he attended the Casablanca and Teheran conferences and was named U.S. representative on the European Advisory Commission (see EUROPE, History), and at the first General Assembly of the U.N. in London (1946) he was chief Amer. representative on the Economic and Social Council, a post which he resigned about a year before his death.

Winchburg, vil. of W. Lothian, Scotland, c. 12 m. W. of Edinburgh, with shale mines, brickworks, and an oil refinery. Pop. 3000.

Winchcombe (anc. *Wincelcumb*), mkt tn of Gloucestershire, England, in a valley of the Cotswolds, 6 m. N.E. of Cheltenham. W. has a fine church, and Sudeley Castle (15th cent.) and Halles Abbey are near by. There are flour and paper mills. Pop. (estimated) 3000. See C. T. Haigh, *The History of Winchcombe Abbey*, 1948.

Winchelsea, vil. and former Cinque Port of Sussex, England, in the par. of Icklesham (q.v.). New W.'s harbour became choked in the 16th cent. The 14th-cent. church belongs to the par. of St Thomas the Apostle. Old W. was finally destroyed by the sea c. 1287. New W. was founded by Edward I c. 1290. Pop. 500.

Winchester: 1. Cathedral city, co. tn, and municipal and parl. bor. of Hants, England, on the It. Itchen, 12 m. N.E. of Southampton and 66 m. by rail from London. During the Rom. occupation of Britain, W., called *Ventia Belgarum*, was a road-centre and the commercial and administrative cap. of a dist. Many Rom. finds from the city are in the City Museum, and remains of Rom. buildings have been discovered during excavations in 1953 and 1954. The Saxon kings of Wessex, who made W. cap. of Saxon England, are said to have been crowned in the old cathedral, of which no traces remain. During this period the W. illuminators became famous. The most notable work they produced was the *Benedictional* of St Aethelwold (c. 975-80), formerly at Chatsworth, since 1957 in the Brit. Museum. Another outstanding book is the 12th-cent. W. Bible, still in the cathedral library. The present cathedral was begun by Bishop Walkelin in 1079. Additions were made by Wm. of Wykeham and others, so that the styles of architecture vary from Norman and Early Eng. to Perpendicular. It is the longest cathedral (556 ft) in England,

with the nave of 351 ft. Noteworthy features of the choir are the altar screen, the carved stalls, the roof bosses, and chests containing the bones of Saxon kings. There are several fine chantry chapels, including those of Wm of Wykeham, Cardinal Beaufort, and Bishop Waynflete. Izaak Walton and Jane Austen are buried in the cathedral. Among kings of England crowned or re-crowned at W. were Wm the Conqueror, and Richard I after his return from captivity. Here also Queen Mary was married to Philip of Spain. Not far from the cathedral lie the 12th-cent. ruins of the episcopal castle of Wolvesey, and adjoining them is the present official residence of the bishops, a building of the late 17th cent. N. of the city was Hyde Abbey, in which King Alfred was buried. Of W. Castle, the only part remaining above ground is the hall, the finest 13th-cent. hall in England, in which is the famous King Arthur's Round Table, made in the Middle Ages. The Westgate, one of the 2 remaining gates of the city, is now a museum, in which is the finest civic collection of old weights and measures in England; the other gate is the Kingsgate, surmounted by St Swithun's church. St Cross Hospital was founded in 1136 by Bishop Henry de Blois. Cardinal Beaufort endowed it in 1446 for the Brethren of Noble Poverty. To-day there are 27 pensioners on the 2 foundations living there, besides many out-pensioners. The church of the Hospital is a fine example of transitional Norman work. Winchester College (q.v.) was founded by Wm of Wykeham in 1394, and St Swithun's School (q.v.) for girls in 1884. The most interesting par. church in W. is St John's, which contains medieval woodwork (screens and pulpit). The old city mill, which for hundreds of years has spanned the Itchen above the City Bridge, has been preserved by the National Trust. On St Catherine's Hill can be seen the rampart and ditch made for its defence by an Iron Age settlement in the 3rd cent. BC.

W. is the home of 3 famous regiments, the Royal Hampshire Regiment, the King's Royal Rifle Corps ('The Sixtieth') 60th Rifles, and the Rifle Brigade. The Rifle Regiments are together known as 'The Greenjackets.' W. is a mkt for agric. produce from the surrounding dist. Pop. 26,300.

See A. F. Leach, *Winchester, its History, Buildings, and People* (3rd ed.), 1933; B. Vesey-FitzGerald, *Winchester*, 1933; Barbara Carpenter Turner, *The Cathedral City of Winchester*, 1954; also *Victoria County History of Hampshire*, section on W. in vol. v; and the *Official Guide*.

2. Residential tn of Middlesex co., Massachusetts, U.S.A., 8 m. NNW. of Boston. It manufs. felt, gelatine, and watch hands. Pop. 15,509.

3. City tn, but independent of, Frederick co., Virginia, U.S.A., with manufs. of leather, textiles, paper, hosiery, rubber goods, packing equipment, and asbestos products; there is also flour milling. Pop. 13,841.

Winchester College, founded by Wm of Wykeham in 1394 as 'the College of the Blessed Virgin Mary of Winchester,' for the education of 70 scholars and 16 choristers. It is now a public school of 500 boys. A substantial number of the original buildings, including the chapel, the central quadrangle known as Chamber Court, and the cloisters, are still in use; notable additions include the School Hall (1687), built in the style of Wren, and a memorial cloister by Sir Herbert Baker to Wykehamists killed in the First World War. W. C. maintains a close connection with New College, Oxford, also founded by Wm of Wykeham.

Winchester Gallon, see METROLOGY.

Winchilsea, Anne Finch, Countess of (c. 1660-1720), poetess, b. Sidmonton, near Southampton, daughter of Sir Wm Kingsmill. She married H. Finch, who succeeded to the earldom of Winchilsea in 1712. A friend of Pope (q.v.) and other writers, she wrote Pindaric odes, and was a pioneer in nature poetry. Her vols. of verse include *The Spleen*, 1701, *The Prodigy*, 1706, and *Miscellany Poems*, 1713.

Winckelmann, Johann Joachim (1717-68), Ger. archaeologist and art critic, b. Stendal, Brandenburg, the son of a shoemaker. He became librarian to the cardinal-secretary of state in Rome, and in 1763 president of the Collection of Antiquities in the Vatican and Vatican Librarian. He was soon the leading authority of his time. The galleries of Rome and Florence are indebted to him, and his advice was of value in the early excavation of Pompeii and Herculaneum. His main work was a comprehensive study of anc. art in 2 parts. The first part was *Gedanken Über die Nachahmung der griechischen Werke*, 1755. The second part, *Geschichte der Kunst des Altertums*, 1764 (new ed., 1934), became world-famous. This comprised a general theory of art and a hist. of art from the so-called Dadales Period. See K. Krauss, *Winckelmann und Homer*, 1935; L. Curtius, *Winckelmann und seine Nachfolge*, 1941; and lives by C. Justi, 1866-72, 1923, and B. Vallengin, 1931.

Winckler, Hugo (1863-1913), Ger. oriental scholar, b. Grafenhamichen. He studied at Berlin Univ., and was prof. of hist. and oriental languages there from 1904. In 1903-4 he made excavations on the site of anc. Sidon, and from 1906 until 1912 at Boghaz Keul in Cappadocia. Here he discovered valuable remains of a Hittite civilisation, including a version in cuneiform of the Ramees-Hittite treaty.

Wind, movement of the air. The W. is not always horizontal, particularly when convection occurs; near the surface it must, for reasons of continuity, follow the slope of the surface, but it is the horizontal motion that predominates. The W. is never steady, varying from sec. to sec. in gusts, which are frequently as much as 20° in direction and 20 per cent in velocity different from the mean W. Gustiness depends not only on the nature of the underlying surface but also on the time of day and state of the sky, being

least on a clear night. Ignoring surface irregularities, such as buildings, hedges, trees, etc., gustiness decreases upwards, but at the same time the velocity increases until the surface effect is negligible. The W. speed is measured at a height of 10 metres (33 ft), and it is usual to call this the surface velocity, even though it is usually much more than the wind at ordinary eye-level. Above this level (1000–3000 ft according to rate of change of temp.) the wind approximates to that given by a comparatively simple hydrodynamic law which requires it to blow along the isobars with high pressure on the right (in the N. hemisphere) with a speed inversely proportional to the distance between them. This motion is called the gradient W.

and timing of distant explosions such as gunfire. The hydrogen-filled balloon or *Pilot Balloon* is allowed to rise freely; it drifts with the W. so that if its position can be calculated the W. velocity can be measured at all heights to which the balloon can be followed. The method used to-day is to attach a small radar target to the balloon and follow the balloon by radar (q.v.). Upper winds have thus been directly measured up to heights of 100,000 ft.

Windbelts. Semi-permanent anticyclones develop over subtropical oceans and consequently the W.s blow more or less steadily round them. These form the trade W.s (q.v.) on the equatorward sides and the prevailing westerlies on the polar sides. In the centres of the anticyclones

<i>Beaufort Number</i>	<i>Beaufort's Description</i>	<i>Land Effect as Devised by Sir George Simpson in 1905</i>	<i>Velocity (at 33 ft)</i>
0	Calm	Smoke rises vertically	m.p.h. 0–1
1	Light air	Direction shown by smoke but not by vane	1–3
2	Light breeze	Wind felt on face; leaves rustle; ordinary vane moved	4–7
3	Gentle breeze	Leaves and small twigs in constant motion; extends a light flag	8–12
4	Moderate breeze	Raises dust and loose paper; small branches moved	13–18
5	Fresh breeze	Small trees in leaf begin to sway; crested wavelets form on inland waters	19–24
6	Strong breeze	Large branches in motion; whistling heard in telegraph wires; umbrellas used with difficulty	25–31
7	Moderate gale	Whole trees in motion; inconvenience felt when walking against wind	32–38
8	Fresh gale	Breaks twigs off trees; generally impedes progress	39–46
9	Strong gale	Slight structural damage occurs (chimney pots and slates removed)	47–54
10	Whole gale	Seldom experienced inland; trees uprooted; considerable structural damage	55–63
11	Storm	Very rarely experienced inland; accompanied by widespread damage	64–75
12	Hurricane	Above 75

This table has recently been extended to Beaufort numbers 13–17 with respective velocities 83–92, 93–103, 104–114, 115–125, 126–138 m.p.h.

Wind Measurement. Direction is easily measured by a W. vane or, in very light winds, by smoke drift. A change in the W. direction is called veering if it changes clockwise and backing if anti-clockwise. W. strength or velocity is much more difficult to measure: the first, severely practical, method was that devised by Adm. Beaufort in 1805, based on the usefulness and effect of the W. for seafaring purposes. The table above gives a specification of each of these Beaufort forces, which are still in use. Equivalent W. velocities as measured by anemometers (q.v.) at 33 ft above a level surface are given in the last column.

W.s above surface level can be measured by watching the clouds (or a shell burst), by tracing the ascent of a hydrogen-filled balloon, or, for extremely high levels, by calculations from the audibility

are regions of calms—the Horse Latitudes—whilst between the anticyclones in the N. hemisphere and the corresponding ones in the S. hemisphere is a belt of light winds or calms known as the Doldrums. These regions all move with the sun during the year, but with little more than 20° total movement compared with the sun's 47°. The westerlies on the poleward sides of the anticyclones enter into the region of depressions and frontal surfaces (see METEOROLOGY) so that they are more variable and stronger. In the S. hemisphere (in the 'Roaring Forties,' after their latitude) they are known as the Brave West W.s. In polar regions, which are very disturbed, the W.s are very variable.

Jet Streams. A recent discovery is that at great heights very strong W.s, confined to relatively narrow 'tubes,' can blow over great distances. Such W.s,

called jet streams, usually blow from a W. point and reach speeds up to 200 m.p.h. They are of great importance in military and civil air operations.

The earth's surface consists of land and water distributed irregularly; since the temp. rises and falls more rapidly over land than over the sea, high pressure develops over the land masses in winter and low pressure in summer, and there are therefore large seasonal changes of wind, inflowing in summer, outflowing in winter. They are known as monsoons (q.v.), and are well marked in many parts of the world, chiefly in S. and E. Asia. A similar effect can be observed daily on quiet, sunny days when the sea-breeze sets in.

The physical features of the land also have a marked effect on the W., for it will tend to flow along valleys and round mt ranges rather than across them. Long ravines may even develop strong W.s if a pressure difference is maintained between ends of the ravine; as the W. continues along the ravine its velocity becomes greater. During a clear night the ground cools and the air in contact cools with it. On a slope the air in contact is therefore cooler than the air away from it but at the same level; and, being heavier, it then flows downhill like water. This is called katabatic W., the similar W. in the reverse direction on warm, sunny days being an anabatic W. The katabatic naturally drains into the valleys, and may eventually augment any ravine W. This does occur in the *mistral* of the Rhône valley, which reaches Marseilles as an icy blast, often at gale strength. When a W. is forced to rise over high land it deposits some of its moisture, and consequently when it descends again it appears phenomenally warm and dry. Such W.s coming from the Alps in Austria are known as Föhn W.s, and coming from the Rockies are known as the Chinook. See G. E. P. Brooks, C. S. Durst, N. Carruthers, D. Dewar, and J. S. Sawyer, *Upper Winds over the World, Geophysical Memoirs* (vol. 10, No. 85), 1950; also bibliography to METEOROLOGY.

Wind Instruments are of 3 classes: (1) keyboard, e.g. organ, concertina, etc., played by bellows; (2) wood-wind, e.g. flute, oboe, clarinet, bassoon, and other reed instruments, played by mouthpiece; and (3) brass, e.g. horn, trumpet, trombone, and other instruments with cup-shaped mouthpieces.

Wind Sucking, see HORSE (DISEASES).

Wind-tunnel, tubular structure in which models and full-sized objects are subjected to artificial winds in order to test their aerodynamic properties. The first W. was made by the Eng. aeronautical pioneers Wenham and Browning in 1871. W.s are used chiefly by designers of aircraft, rockets, ships, bridges, and automobiles.

Windermere: 1. Largest lake in England (11 m. by 1-1½ m. broad), on the boundary of Westmorland and Lancs. Its shores are much indented and wooded. It drains into Morecambe Bay through the Leven. See also LAKE DISTRICT.

2. Urb. dist. and resort in Westmorland, England, 4½ m. S.E. of Ambleside, on Lake W. Pop. 6500.

Windflower, see ANEMONE.

Windham, William (1750-1810), politician, educ. at Eton and Univ. College, Oxford. Under Pitt he was, from 1794 to 1801, secretary for war, and in 1806-7 was secretary of state for war and the colonies in the Grenville administration. He was brilliant and loyal to Pitt, but his changes of opinion earned him the nickname of 'Weathercock W.'

Windhoek, cap. of SW. Africa. It has hot thermal springs, and is connected by railway with Swakopmund, on the coast, and the Keetmanshoop (a distance of 380 m.). There are mineral deposits in the dist. It is the main buying centre for karakul skins. W. was entered by S. African forces in May 1915 when SW. Africa was captured from the Germans. Pop.: (European) 13,000; (others) 26,000.

Windlass, machine used for lifting weights through a considerable distance, as in raising water from a well. It consists of a cylindrical roller made to rotate upon its axis by a crank and handle. The weight is attached to a long rope which is coiled round the roller as the handle is turned.

Windmill Hill, hill 1½ m. NW. of Avebury, Wilts, England, is the site of an earthwork camp with interrupted ditches which has given its name to the earliest culture of the Eng. Neolithic. These farmers bred cattle, cultivated wheat in small plots, specialised in the mining of flint for tools and weapons, and traded in these products, and they introduced, particularly from Switzerland and France, a distinctive type of pottery which in the first instance was derived from leather prototypes. A detailed study of this pottery has suggested 3 distinct migrations in the make-up of W. H. culture. Some of the W. H. arca is preserved by the National Trust. See T. D. Kendrick and C. F. C. Hawkes, *Archaeology in England and Wales, 1914-1931, 1932*; V. G. Childe, *Prehistoric Communities of the British Isles, 1940, 1947*; Stuart Piggott, *Neolithic Cultures of the British Isles, 1954*.

Windmill Theatre, London theatre, seating 320, situated in Great Windmill Street, W.1. At first a straight playhouse, and then a cinema, it was opened in 1932 by Mrs Laura Henderson and Vivian Van Dam for the presentation of non-stop variety. In 1936 Van Dam took over production. During the Second World War the W. took as its motto 'We Never Closed,' and became famous as the only theatre to remain open during the whole of the London blitz. When she died in 1944, Mrs Henderson left the W. to Van Dam, who then became owner-manager-producer. The *Reruderville* production which plays 6 performances a day has a change of programme every 6 weeks, 2 troupes of girls working alternate days.

Windmills. The earliest references to W. in England appeared late in the 12th cent., when a mill could be built only for the lord of the manor. From then until

the 14th cent., W. were of the type known now as post mills. The principle of such a mill is generally as follows: the body is supported on a massive wooden post, upon which it may be rotated to face the wind; and the post rests upon 2 wooden cross-trees with 4 supporting struts or quarter bars. The cross-trees usually stand on 4 brick or stone piers, which are often enclosed in a round-house, which is used for storage. The mill sails are attached to a wooden or cast-iron windshaft, which is usually inclined to the horizontal at an angle of 10°-15°, and which carries a large



Photograph by D. W. Muggerridge: Society for the Protection of Ancient Buildings

OUTWOOD MILL, SURREY

wood-toothed gear wheel. This gear wheel, called the brake wheel because it has about it a wooden or iron brake band, drives the horizontal millstones through a small pinion or nut. There is sometimes a second large gear wheel on the windshaft known as the tail wheel, which drives a second pair of millstones nearer the tail of the mill. Access to the mill body is by a ladder, through which protrudes a long tail pole used for facing the mill to the wind. Sacks of grain are lifted up inside the mill by a hoist driven from the windshaft, and tipped into hoppers which feed the stones. The meal runs from the stones into bins or sacks, or perhaps into a dresser which makes flour by separating the bran from the meal. One of the earliest mills remaining in England is the post mill at Bourne, Cambridgeshire, research having established that it was there in 1636; the earliest still at work is that at Outwood, Surrey, built in 1665.

About the middle of the 14th cent. the tower mill was invented. In such a mill, the machinery is contained in a round or

octagonal body, and the cap at the top carries the sails and is turned to face the wind. The internal economy of the tower mill is similar to the post mill, except that the brake wheel drives an intermediate gear or wallower at the top of a vertical shaft, which conveys the power to the millstones on the first floor of the mill. The second floor carries the hoppers which feed the stones, and the floors above are used for storage. The body of a tower mill proper is built of stone or brick, but frequently wooden studwork and weatherboarding are used from the first floor, or stone floor, upwards. In this case the mill is known as a smock mill. The cap is made of wood, sometimes protected with canvas, and the shape of the cap is identifiable with the dist. in which the mill is built. A cap shaped like an inverted boat is common in Norfolk, whilst in Lincs, where the tower mill is most highly developed, the graceful ogee-shaped cap is typical. The problem of turning a rotating cap on top of a tall tower was not conveniently met by the use of a tail pole, as in post mill practice. Accordingly, other methods were invented. The top of the tower, on which the cap rests and is rotated, is called the curb. A rack was fixed round the curb, and a gear attached to the cap and meshing with the rack was turned by a chain wheel and a chain hanging down to the ground. This system simplified the operation, and examples remain today. In 1745, however, a method of facing the sails to the wind automatically was patented by Edmund Lee. A fan was placed behind the cap at right angles to the sails. When the sails are facing the wind the fan is stationary, but when the wind changes its direction the fan is turned. The fan is geared to the rack round the curb, and therefore turns the cap until the sails again face the wind. This system has since been applied also to post mills.

The oldest windmill sails consisted of a wooden framework covered with canvas. The canvas hung on rings like curtain rings and was drawn across the sail, like a curtain, to cover the framework partially or completely as required, and tied in place. To carry this out the miller had to climb the sails, which was often hazardous. In 1772 Andrew Meikle invented the spring sail. This had, instead of canvases, a number of shutters similar to a Venetian blind, held shut by springs, the tension of which was adjustable. A further improvement was the 'Patent' sail, invented in 1807 by Sir Wm Cubitt. This is the sail now most commonly seen, and consists of a number of shutters held closed by a weight, which, working through a system of levers and links, hangs on a chain close to the ground at the tail of the mill.

At one time there may have been as many as 10,000 W. working in England. At the present time (1958) there are less than 50, and the number is decreasing steadily. Apart from mills used for grinding corn, some 2000 marsh mills once pumped water off the fenland. Now

none of these is left at work. Considerable improvements in windmill efficiency have been made by Dekker, in Holland, using roller bearings and sails of aerfoil section, but the W. used in contemporary experiments in generating electricity by wind-power bear no resemblance to the traditional corn mill. An important experiment of this kind was carried out with a 1500-kilowatt generator driven by a 200-ft wind turbine having 2 blades of adjustable pitch. This set was built at Grandpa's Knob, near Rutland, Vermont, U.S.A., in 1940-1, and valuable data were obtained. See P. C. Putnam, *Power from the Wind*, 1948; R. Wallis, *Windmills in England*, 1948.

Window (probably from the words 'wind,' 'eye'), a glazed opening in an exterior wall of a building to admit light and air. The Greeks and Romans often used W.s, occasionally glazed in Roman times; but during the Middle Ages they were seldom provided except in churches and important buildings; and glazing became common in dwelling-houses only during the Tudor period. A medieval or Tudor W. may be divided into lights by vertical mullions, by horizontal transoms, or by tracery. The top of a W. opening is the head, the bottom is the sill, the sides are the jambs. Each light may be divided into panes. Before the invention of sash-W.s (properly, 'double-hung sashes') towards the end of the 17th cent., all W.s were wooden or occasionally iron casements, generally side-hung to open inwards or outwards. Modern casements may be of steel, and are sometimes hung at top or bottom. Where leaded glazing in small panes is used these are sometimes called 'quarrels.' They are fixed in narrow strips of lead ('cames'). Leaded casements are usually stiffened by horizontal iron 'saddle-bars.'

See also **RAY-WINDOW**; **CASEMENT**; **DORMER**; **FANLIGHT**; **JESSE WINDOW**; **JOINERY**; **LANCET**; **MULLION**; **ORIEL**; **ROSE-WINDOW**; **SASH-WINDOW**; **TRACERY**; **TRANSOME**.

Window Gardening. This term is applied to the growing of plants and flowers in pots, bowls, and boxes placed upon the outside window-sills of houses or flats and is practised in tns where space for gardens is non-existent. With careful planning a fine display of colourful flowers may be had for a greater part of the year. Success depends upon the careful planning of a succession of suitable plants; bulbs in spring, daffodils, narcissi, hyacinths; later freesias, nasturtiums, petunias, lobelias, and geraniums, all provide colourful displays. Boxes should be of hard wood and preferably zinc-lined or charred to prevent rotting, and have holes for drainage; the earth should consist of a carefully balanced compost of turf-loam, leaf mould, sand, and manure. Watering should be frequent and the boxes and pots emptied and refilled once in each season. Other plants suitable for cultivation in window-gardens are cacti (some of which produce surprisingly brilliant flowers), various

palms and ferns, fuchsias, marguerites, and chrysanthemums. See W. P. Wright, *Room and Window Gardening*, 1937.

Windpipe, see **TRACHEA**.

Windscale, atomic plant in Cumberland, England, adjoining Calder Hall (see **CALDERBRIDGE**). At W. plutonium is produced on a commercial scale from uranium. An accident occurred on 10 Oct. 1957 during a controlled release of stored Wigner energy from the graphite of No. 1 pile. Water was used to extinguish the ensuing fire. As a result radioactive substances, chiefly iodine 131 and strontium isotopes, were disseminated locally. Immediate precautions were taken to protect workers and others in the area, and large quantities of radio-contaminated milk were destroyed over a period of sev. weeks. See H.M.S.O. White Paper, Cmd. 302, 1957. See also **NUCLEAR FALLOUT**; **NUCLEAR POWER**.

Windsor, Bessie Wallis Warfield, Duchess of (1896-), wife of H.R.H. Duke of Windsor, formerly Edward VIII (q.v.). She was b. Baltimore, Maryland, U.S.A., and married E. W. Spencer, an Amer. naval officer, in 1916, divorcing him 9 years later. She married Ernest Simpson in 1928, living with him in London. Subsequently the Simpsons became close friends of the then Prince of Wales. They were divorced in 1936, and in June 1937 Mrs. Simpson (who had reverted to her maiden name of Warfield) married the ex-king (now Duke of Windsor) in France. Her memoirs were pub. as *The Heart Has Its Reasons*, 1956.

Windsor, Duke of, see **EDWARD VIII**.

Windsor, House of. Family name of the royal house of Great Britain, King George V being regarded as the founder, having in 1917 given up for himself and his family all Ger. titles, together with the dynastic names of Saxe-Coburg-Gotha acquired through the marriage of Queen Victoria with Prince Albert. On 17 July 1917 King George V declared by proclamation that thenceforth his family should be known as 'The House and Family of Windsor.' Queen Elizabeth II and her children have retained the surname of Windsor.

Windsor: 1. Mun. bor. (since 1277), in full the Royal Bor. of New Windsor, in Berkshire, England, on the Thames, 22 m. from London. W. adjoins the vil. of Old Windsor, 2 m. to the SE. It contains a tn hall built under the supervision of Sir Christopher Wren in 1686, the church of St John the Baptist (rebuilt 1822), with fine examples of Grinling Gibbons's wood-carving, and a fine Jubilee statue of Queen Victoria; but it owes its importance to the castle, which is one of the prin. royal residences, and the Great Park. Eton College (q.v.) is outside W. The tn was formerly famous for its inns, one of which, the Garter (demolished c. 1680), is frequently mentioned by Shakespeare. The par. church of Clewer St Andrew is a fine example of Norman architecture. W. is a co. constituency. Pop. 23,770.

2. Tn on Hawkesbury R. in Cumberland co., Australia, 34 m. NW. of Sydney. W. is one of the oldest tns in the state, and

includes many mkt gardens growing vegetables to supply the Sydney area. A large air-force station (Richmond) is situated near by. Po. 10,110.

3. City, co. tn of Essex, and lake port of Ontario, Canada, $\frac{1}{2}$ m. S. of Detroit, with which it is connected by the Ambassador Bridge and Detroit-Canada Tunnel, across the Detroit riv., 240 m. W. of Toronto. It is a port for all Canadian steamers on the Great Lakes and is on the Canadian National and Canadian Pacific Railways, and on 3 U.S. railway lines. It has a modern air-

Windsor Castle, Eng. royal palace. It is one of the best-known among the royal edifices of Europe. The first structure on the site was that of the Conqueror, but the plan did not begin to assume its present state and arrangement until the 14th cent., when extensive building operations were carried on under the surveillance of Wm of Wykeham. One of the most impressive features of W. Castle is St George's Chapel, a fine example, though much restored, of Perpendicular architecture, in which many Eng. sovereigns are buried. Under Elizabeth I the terraces



WINDSOR CASTLE

port. It is the centre of Canada's motor-car industry, and also produces some two-thirds of the dominion's pharmaceutical output. It has over 350 factories. Its other industries include tools, adding machines, clothing, paint, forgings, and stampings, etc. W. has numerous public, primary, and secondary schools, and sev. public libraries. There are 3 hospitals and a great many parks. The city is in the midst of a good mixed farming dist. and there are salt mines in the vicinity. Electric power is obtained from the Niagara Falls. Pop. 126,034.

4. Cap. of Hants co., Nova Scotia, Canada, 45 m. from Halifax, centre of an agric. area, which also has gypsum and limestone quarries. W. manufactures textiles, fertiliser, and lumber products. Pop. 3440.

Windsor, Military Knights of, see MILITARY KNIGHTS OF WINDSOR.

were formed, and the castle was thus given one of its most striking and attractive characteristics. George III, among other alterations, renovated the interior of St George's Chapel, but the main work of improvement was left to his successor, under whom extensive alterations were carried out by Wyatt. To the South of the castle is Windsor Great Park, comprising 4800 ac., connected with the castle by a 3-m.-long straight drive known as the Long Walk. To the S. is the Royal Lodge, private home of the royal family since 1932. See H. Bolitho, *Romance of Windsor Castle*, 1947; Sir Owen Morshead, *Windsor Castle*, 1951.

Windt, Harry de, see DE WINT, HARRY.

Windus, W. E., see HOTTEN, J. C.

Windward Islands, group of the Brit. W. Indian Is. between 12° and 16° N. and in long. 61° W. of Greenwich, N.E. of Venezuela, comprising the colonies of

Grenada (the seat of the gov.), Dominica since 1940, St Vincent, and St Lucia, with their dependencies, the Grenadines (q.v.) being divided between Grenada and St Vincent. They were swept by a devastating hurricane in Sept. 1955, but the weather is normally very favourable and attracts tourists. Universal adult suffrage was among the modifications of the constitutions approved in 1950, and ministerial systems were introduced in 1956. Cocoa, rum, sugar, arrowroot, and spices are produced. Area approximately 830 sq. m.; pop. 313,000. *See also WEST INDIES.*

Wine should be defined as the fermented juice of freshly gathered ripe grapes. The term is also applied to alcoholic beverages made from other fruit, as well as vegetables, which are dealt with under the heading WINES, HOME-MADE. A cluster of grapes consists of the stalk, which contains tannic and other acids, and the berries, which are composed of the skin, which holds both acids and the colouring matter of the W., the pips holding tannin and an astringent resin liable to make the W. unpalatable if they are broken in the pressing, and the juice, which combines sugar and various organic and inorganic acids and salts in solution. The juice pressed from the grapes is set fermenting by yeasts called *saccharomyces* in the bloom of the berry, which supply enzymes to start the process. (*See FERMENTATION.*) When the grapes have been pressed for white W., whether they are black or white, the juice is run off into vats, where it ferments apart from the stalks, skins, and pips. For red W.s, the juice ferments in contact with the skins, which contain the colouring matter, soluble as soon as alcohol has been formed, the pips, and such a proportion of the stalks as experience advises. The time required for the first fermentation varies with various regions; it ceases when it has transformed almost all of the sugar into alcohol, though enough traces remain to keep the yeasts alive and working. Probably the highest alcoholic degree attained by any W. naturally fermented is 17 per cent of alcohol occasionally reached by Châteauneuf-du-Pape; such a W. as Montrachet may show 15 per cent. W., after it has ceased to be must, goes on living with what is left of the fermenting yeasts, which need oxygen for their continued existence. As long as W. is in the cask it receives through the wood enough air to keep it developing, and ordinary W.s which cannot be long-lived are drunk from the wood. Certain W.s, thanks to the quality of their grapes, the conditions of their growth and making, retain after a long spell in the cask sufficient yeasts and traces of sugar to go on improving when they are more completely cut off from the outer air in the sealed bottle in which the air bubble is very sparingly reinforced with oxygen from outside. The principles of fermentation were discovered by Pasteur (q.v.) in the sixties, and he showed that W. after heating to about 140° F. was immune from certain

diseases due to the bad yeasts which accompany the fermentation yeasts in the finished W.; but pasteurisation kills both good and bad yeasts, and after it the W. ceases to mature. Of late, an asbestos filter has been invented to remove from young W. every living organism, with the result that it can be sold younger without danger of secondary fermentation in the bottle; but such W.s only deteriorate with time. In the bad years sugar is added to the must in N. vineyards to increase the alcoholic degree, but chaptalisation, as it is called from the chemist Chaptal (q.v.), dulls the flavour and obscures the bouquet.

EUROPEAN WINE PRODUCTION: 1955

Figures in gallons; those in *italic* estimated.

France	1,321,508,738
Italy	<i>1,230,000,000</i>
Spain	354,530,000
Portugal	232,563,980
U.S.S.R.	<i>140,294,000</i>
Rumania	91,003,000
Hungary	88,000,000
Yugoslavia	83,600,000
Greece	72,600,000
Germany	51,040,000
Austria	20,275,200
Switzerland	17,395,400
Bulgaria	9,372,000
Czechoslovakia	8,998,000
Turkey	4,400,000
Cyprus	2,766,896
Luxembourg	2,596,000
Malta	1,100,000
Holland	66,000

(Statistics published by Office International du Vin and quoted in *Wine and Food Quarterly*, June 1956)

See H. Warner Allen, Natural Red Wines, 1951, White Wines and Cognac, 1952, and Sherry and Port, 1952; F. Chancrin, Le Vin; André L. Simon, The Noble Grapes and the Great Wines of France, 1957. Also the articles on separate W.s under their individual headings.

Wine (Casks), *see* WINE; METROLOGY.

Wine Month, *see* OCTOBER.

Wineand, *see* VINLAND.

Wines, Home-made, are fermented mainly from fruits, vegetables, and flowers. All can be equally alcoholic. Grains, e.g., barley, wheat, and rice are used to strengthen these or with added flavours to make wines of their own. To protect flavour only wood, glass, china, or stone is used, and wooden spoons, and constant covering with thick cloths or loose corks is essential to keep out flies and wild yeasts which make wine bitter. Store at least 6 months. *Fruits* are picked ripe and dry in fine weather to preserve flavours and fruit yeasts, crushed, covered with the boiling water, and left for days or weeks, being stirred daily to extract juice and prevent mould. Time can be saved by boiling the fruit, but this destroys the fruit yeasts. To clear, strain through 3 layers of muslin or a hair sieve or both, and throw away pulp without

squeezing. Add 2½-5 lb. sugar and 1 oz. yeast to the gallon and let ferment 5 or 6 weeks or until all buzzing ceases. Stir, let settle sev. days, bottle, and keep in a cold, dry place to prevent ferment re-starting. *Vegetables*, at about 4 lb. per gallon, are cooked tender, strained, and 3-4 lb. sugar and 1 oz. yeast added, plus juice and rind (no pith) of a lemon, ½ oz. crushed ginger root, and from a few oz. to 1 lb. raisins. *Flowers* also follow the process in general. Amounts depend on scent, only ½ gallon of elderflower to a gallon of water, against gallon for gallon of delicate dandelion. Soak a day or two, use 3-4 lb. sugar and a lemon. Flower wines mature more quickly, and some can be drunk within 4 or 5 months. Weekly tasting of wine as soon as the yeast and sugar are added is recommended by some to test flavour. More lemon, orange, or ginger root can be added, or more sugar if a sweet wine is wanted. Pepper corns give bite to a Burgundy type. Fermenting temp. should be kept steady within 10° at the most, a steady 65°-70° F. being considered the best. If ferment stops too soon it can be re-started by adding a few oz. of sugar and removing to a warmer spot. A thermometer should stand near the fermenting vessel.

Winfield, seat of Cowley co., Kansas, U.S.A., on the Walnut R. It is a trade and shipping centre in a live-stock, grain, and oil region, with flour mills, grain elevators, machine shops, and stockyards. There is dairying, metal products, and poultry packing. Here is the South-western (Methodist) College founded in 1885. Pop. 10,264.

Winfrith, see BONIFACE, ST.

Wing Commander, see IRANK.

Wingate, Orde Charles (1903-44), soldier, educ. at Charterhouse and R.M.A., Woolwich; gazetted to the Royal Artillery in 1923, and served with the Sudan Defence Force, 1928-33. In Palestine he organised and led a force of soldiers and police for night operations during the Arab revolt (1936-8), and was awarded the D.S.O. In 1938 for his work there as head of the Jewish counter-guerillas. When the Second World War broke out he was selected for special service under Wavell (q.v.), as leader of the Abyssinian partisans, whose force he organised with even more marked success than in Palestine. By the time he went to Burma to organise guerrilla war there he was the man most fitted in the Allied forces to form, train, and lead the 'Jungle Commando.' He was made a maj.-gen. in 1942. His famous brigade of 'Chindits,' consisting of Brit. and Gurkha columns with intelligence detachments from the Burma Rifles, penetrated great distances across jungle ranges and valleys. Skillfully infiltrating through the Jap. outposts and garrisons, his force penetrated hostile ter. as far as the Shan States. For this service he was awarded the Royal Central Asian Society's Lawrence of Arabia gold medal (1943). He was killed in a plane accident in Burma, 24 Mar. 1944, during an operational flight. See

W. G. Burchett, *Wingate's Phantom Army*, 1947; L. Mosley, *Gidcon Goes to War*, 1955.

Wings, see BIRD; FLYING.

Winifred, St. (d. c. 650), Welsh virgin. She was beheaded by Caradoc of Harwarden for refusing to submit to his attempted seductions. Miraculous cures at Holywell (Flintshire) are attributed to her intercession. Her feast is on 3 Nov.

Winkelried, Arnold von, Swiss knight and hero of the Unterwalden. During the struggle for independence by the Swiss freemen and peasantry against the Austrian archduke, a battle was fought at Sempach, a small vll. some few m. distant from Luzern, in July 1386, the Austrians being led by their archduke, Leopold. The Austrians, who numbered about 4000, were opposed by 1500 Swiss. The Swiss struggled heroically against the Austrians, but could make no impression upon the phalanx of heavily armoured pike-bearing soldiers. A. von W., seeing that the only way to defeat the Austrians was to open a way through their ranks, rushed upon the spears, and grasping a number of the long pikes in his embrace cleared a road for his companions in arms over his pierced body. At close quarters the Austrians, hampered by their armour, were annihilated, and the independence of Switzerland was won. The anniversary of the death of A. is still observed as a local festival.

Winkin de Worde, Jan van, see WORDE.

Winkle, see PERIWINKLE.

Winnabago, Lake, largest lake (30 m. long and 5-10 m. wide, with an area of 215 sq. m.) in Wisconsin, U.S.A. The Fox R. enters it from the W. at Oshkosh and leaves it on the N. for Green Bay. It is used for lake sports.

Winnington-Ingram, Arthur Foley (1858-1946), prelate, educ. at Marlborough College and at Keble College, Oxford. He succeeded Creighton as Bishop of London in 1901 and resigned in 1939.

Winnipeg, cap. and largest city of Manitoba, Canada, fourth largest city in the Dominion. It is situated at the confluence of the Red and Assiniboine R.s. in the SE. part of the prov., 40 m. S. of Lake Winnipeg, and 60 m. N. of the boundary between Canada and the U.S.A. The altitude is 760 ft. above sea-level. The area of the city includes 15,535 ac. of land and 465 of waterways. Pop. (1956) 256,683; Greater Winnipeg 409,687.

The first white men to stop at this site were Pierre Gaultier de la Verendrye and his party in 1738. The NW. Company estab. the fur-trading post of Fort Gibraltar about 1810. This post was re-estab. by the Hudson's Bay Company as Fort Garry in 1822. Between 1811 and 1815 Lord Selkirk purchased from the Hudson's Bay Company 116,000 sq. m. of ter. known as the Dist. of Assinibois and settled the area around Red R. near its junction with the Assiniboine with families from Scotland. They introduced agriculture into Manitoba (Cree Red River Settlement). In 1821 both the fur-trade companies combined under the name of the Hudson's Bay Company, and the

Selkirk colony was permitted to develop. In the 1850's steps were taken to provide for the transfer of the W. of Canada from the Hudson's Bay Company to the Dominion of Canada. The transfer was finally accomplished in 1870, and in July the prov. of Manitoba was created and its cap. erected at the hamlet of W. W. was chartered as a city in 1873 with a pop. of 1869.

The city's administration is carried on by a mayor and 18 aldermen. The mayor is elected for a 2-year term by a vote of the entire city. Three aldermen are elected annually from each of the 3

flights S. to the U.S.A. Since the advent of commercial aviation W. has become a centre of Canadian and international air traffic and is the air terminal serving N. mining developments.

W. developed rapidly after the building of the first railway lines. Greater W. is now the industrial centre for the Prairie Provs. and is the H.Q. for a number of large wholesale and retail houses. Together with the neighbouring city of St Boniface (q.v.), W. has sev. meat-packing plants. Within the city and its suburbs are various manufacturing industries that produce clothing, cotton, furniture, jute



National Film Board, Canada

WINNIPEG: PORTAGE AVENUE, LOOKING EAST FROM SMITH STREET

wards into which W. is divided and hold office for a term of 2 years. Public schools are controlled and supervised by the Board of School Trustees composed of 15 members, 5 for each of the 3 wards. The Police Dept is administered by a Board of Police Commissioners. W. Board of Parks and Recreation control and supervise the public parks of the city. The first Canadian Pacific Railway train arrived in St Boniface across the Red R. from the S. in 1878, providing a link with E. Canada via St Paul, Chicago, and Detroit. The C.P.R. line arrived in W. in 1881, being completed transcontinentally in 1885. Besides the C.P.R., the Canadian National Railway, which has western H.Q. in W., the Soo Line, the N. Pacific, and the Great N. Railroads serve W. The 3 last connect with the U.S.A. Air terminals include Trans-Canada Air Lines and Canadian Pacific Air Lines. NW. Air Lines operate daily

and fur goods. Food-processing mills produce flour and malt products. Printing and publishing are carried on, and there are railway repair shops. W. is one of the largest grain mtrks in the world, and contains many wholesale houses which serve as distributing centres. Fur auctions are held annually and draw buyers from all over the continent.

There are 2 extensive natural parks on the city's outskirts. W. is the seat of the univ. of Manitoba and some of its affiliated colleges. The plan of the city is strictly geometrical: the streets are wide and straight, and spacing is good. Since 1912 the hydro-electric power resources of the W.R., 70 m. NE. of the city, have been increasingly exploited. In 1950 heavy damage was done to the city when the Red R. overflowed its banks.

In 1956, W. held its 38th annual Music Festival. It has a Symphony Orchestra, Little Theatre, Art Gallery and Museum,

and Royal Winnipeg Ballet. See also under MANITOBA.

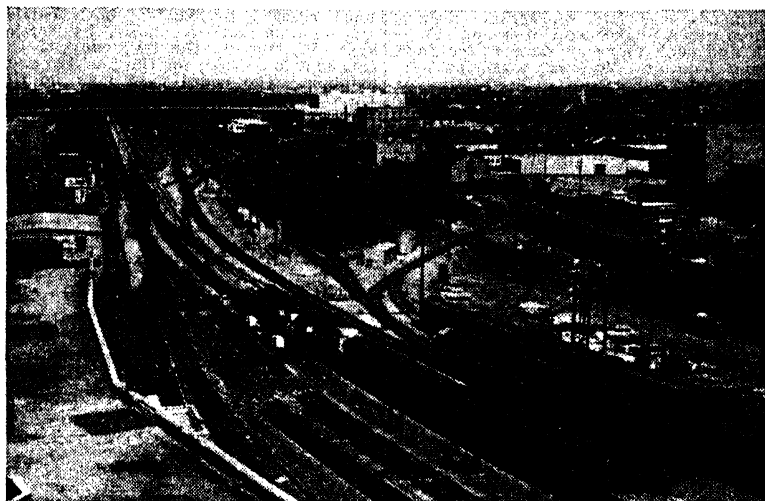
Winnipeg, Lake, lake in the prov. of Manitoba, Canada. It has a length of 250 m., and is from 5 to 7 m. broad. Elevation 713 ft, area 9084 sq. m.

Winnipegosis, Lake, shallow lake in NW. Manitoba, Canada, extending into Saskatchewan. It has a length of 127 m., an area of 2086 sq. m., and an elevation of 831 ft.

Winona, city, co. seat of Winona co., Minnesota, U.S.A., on the Mississippi R., with railway repair shops and limestone quarries. It manufs. food products, bricks, patent medicines, clothing, and

in 1703. See also EDDYSTONE LIGHTHOUSE.

Winston-Salem, city, co. seat of Forsyth co., N. Carolina, U.S.A. It is a port of entry and the commercial centre of a fertile agric. region, especially noted for its tobacco; the growth of W. is chiefly due to this industry, and the manuf. of cigarettes and flat plug tobacco here is most important. Nylon yarn, underwear, hosiery, furniture, and communications equipment are also manufactured. W. is the seat of Salem College, W. Teachers' College, and the medical school of Wake Forest College. It is the second largest city in the state. Winston and



Manitoba Travel & Publicity Bureau
RAILWAY YARDS AT WINNIPEG

wood products. It is the seat of W. State Teachers' College, St Mary's College, and the College of St Teresa. Pop. 25,000.

Winsford, tn of Cheshire, England, situated on the R. Weaver, 17 m. E. of Chester. The anct bor. of Over, with its 12th-cent. church, is part of the urb. dist. Salt is manufactured from vast resources of underground brine, and agriculture is another main industry. Pop. 12,860.

Winslow, mrkt tn of Buckinghamshire, England, 6 m. SE. of Buckingham. W. was the site of a palace of the kings of Mercia. The church dates from the 13th cent., and W. Hall was built in 1700. Pop. 1500.

Winstanley, Henry (1644-1703), engineer, b. Saffron Walden. In 1666 he became clerk of works to Charles II. He began designing the first lighthouse at Eddystone in 1696. It was finished 4 years later, but was destroyed in a storm

Salem were combined in 1913. Pop. 87,811.

Wint, Peter de (1784-1849), landscape painter of Dutch origin and a 'little master' of the old Eng. school, b. Stone, Staffordshire. He studied at the Royal Academy. De W. is best known for his water-colours of lush, tree-lined meadows by the Trent and Thames, and the city of Lincoln and its surrounding countryside.

Winter, fourth season of the year. It commences, astronomically, when the sun has attained its lowest declination, i.e. its lowest noon position in the sky. This occurs for the N. hemisphere when the sun enters the sign of Capricorn, for the S. when it enters the sign of Cancer. The sun's rays falling at the least angle with the horizon, the temp. falls, to rise again towards spring, when the sun passes its mean noon position. Climatically, W. is very varied, corresponding usually with a dry season, but in 'Mediterranean'

regions with a wet season. Biologically, it is the ann. period of suspended animation for many forms of life. See SEASONS.

Winter Berry, or **Black Alder**, shrub (*Ilex verticillata*), of the family Aquifoliaceae, indigenous to eastern N. America, it reaches a height of 6 ft. and has long alternate lanceolate leaves with toothed edges, small white flowers, and red berries. The bark has medicinal properties.

Winter Garden Theatre, theatre in Drury Lane, London. In 1919 the theatre known as the Middlesex music-hall had structural alterations and was then re-opened as the W. G. T. It became famous for its musical comedies. During the Second World War more emphasis was laid on serious drama; there was a Shakespearean season (1945-6), and such plays as *Love on the Dole*, *Saint Joan*, and *No Room at the Inn* were produced.

Winter Sports, open-air athletic sports carried out in snow or on ice. Since the end of the 19th cent., W. S. have been much developed and popularised. They now form a part of the Olympic Games. Switzerland is the chief site of W. S.; but others in Europe include Norway, Sweden, Germany, and Austria, and there are sites in Canada, Australia, S. Africa, and the U.S.A. See further under CURLING; SKATING; SKI and SKIING; SLEIGH; TOBOGGANING.

Wintergreen, see PYROLA.

Winterhalter, Franz Xavier (1806-73), Ger. portrait painter, b. Menzenschwand in the Black Forest. He studied painting in Munich. He had a facile, popular style, and is best known in England for his paintings of Queen Victoria and the Royal Family.

Winter's Bark, bark of *Drimys winteri*, an evergreen tree (family Magnoliaceae). W. B. resembles cinnamon, and is used as a tonic and as a spice.

Winterthur, industrial tn of Switzerland in the canton of Zürich, manufacturing textiles, locomotives, machinery, and cotton. The present tn was founded in 1180, and for 2 cents. it was under the Hapsburgs; in the 15th cent. it was sold to the city of Zürich. A good wine is produced in the neighbourhood. It has some fine medieval eccles. architecture, and some good civic buildings in the baroque style. Pop. (1957) 73,800, Ger.-speaking.

Winthrop, John (1588-1649), Eng. colonist, governor of the colony of Massachusetts (1630-34 and 1637-49), b. Edwardstone, Suffolk, and educ. at Trinity College, Cambridge, and at the Inner Temple. He sailed in the *Arbella* from Yarmouth to America with sev. hundred persons in 1630, and helped to found Boston. See his Journal, ed. by J. K. Hosmer, *The History of New England from 1630 to 1649*, 1853, and *Winthrop Papers*, 5 vols., 1929-47.

Winthrop, Theodore (1828-61), Amer. novelist, b. New Haven, Connecticut. Educ. at Yale, he met an early death in the Civil war. His novels, all pub. after his death, had great popularity. They

include *Cecil Dreeme*, 1861, *John Brent*, 1862, and *Edwin Brothertoft*, 1862. His *Life and Poems* were pub. by L. W. Johnson, 1884.

Winze, see MINING.

Wiping, see SOLDER and SOLDERING.

Wippendorf, see NEUMÜNSTER.

Wire Walker, see ACROBAT.

Wireless, see RADIOCOMMUNICATION; BROADCASTING.

Wireless Direction Finding, see DIRECTION-FINDING.

Wireless Telegraphy, system of radio-communication other than telephony. Intelligence is conveyed either by turning the transmitter carrier wave on and off in accordance with code symbols, by keying modulation on and off to a continuous carrier, by keying both carrier and modulation, or, finally, by carrier shift, i.e. moving the frequency of the carrier a few cycles for the positive code symbols. The codes used may be the International Morse Code or 5-unit teleprinter code for direct operation of teleprinter machines.

See MODULATION; POST OFFICE (TELEGRAPHS and TELEPHONES); TELEGRAPHY.

Wireworm, see CLICK-BEETLES.

Wiring, Electric, see ELECTRICITY IN THE HOME.

Wirksworth, urb. dist. and mrkt tn of Derbyshire, England, 14 m. NNW. of Derby; it has lead mines, stone quarries, and manufs. of tape and holsey. St Mary's church dates from the 13th cent. Pop. 4927.

Wirral, peninsula of Cheshire, England. It is bounded by the Dee estuary on the W. and the Mersey estuary on the E. An electric railway provides a suburban service for Liverpool through the Mersey Tunnel. The coast of W. contains a number of seaside resorts. W. is also the name of a co. constituency, returning one member to Parliament.

Wisbech, mun. bor. of the Isle of Ely, Cambs, England, on the R. Nene, in the centre of an agric. and fruit-growing dist.; it has manufs. of agric. implements and engineering, beer, oil-cake, baskets, and there are tanning and preserving, timber, can-making, and printing industries. It is a port, vessels up to 2000 tons using it. There are some good examples of Georgian architecture in W. Pop. 17,400.

Wisby, see VISBY.

Wiscard, Robert, see GUISSARD.

Wisconsin: 1. N. central state of the U.S.A., the 'Badger State,' bounded N. by Michigan and Lake Superior, E. by Lake Michigan, S. by Illinois, SW. by Iowa and Minnesota, W. and NW. by Minnesota. It measures 300 m. N. to S. and 280 at the widest E. to W., and has an area of 56,154 sq. m. The St Croix R. and the Mississippi separate it from Minnesota and Iowa. Other rivs. are the Menominee (118 m. long to Green Bay, forming part of the Michigan state line), the Wisconsin (430 m. long from the N. edge of the state S. and SW. to the Mississippi R. opposite Iowa), the Chippewa (200 m. long to the Mississippi SW. of Eau Claire), the Fox (176 m. long to

Green Bay), and the Rock (from the neighbourhood of Fond du Lac to the Illinois border near Beloit). The largest interior body of water is Lake Winnebago (215 sq. m.). There are numerous small lakes; among the best known are Lake Geneva near the Illinois border, Lake Mendota at Madison, and Devil's Lake (with a state park) 40 m. NW. of Madison. W. is no longer heavily forested. Of mineral resources building stone (sandstone, granite, dolomite) is most valuable. Some iron is mined near Lake Superior, and zinc and lead are mined in the SW. corner. In agriculture W. is primarily a dairying state and ranks first in milk cows and the production of hay and of milk and cheese. It grows many vegetables, and cranberries, strawberries, and cherries. In industry the SE. is most important—Milwaukee, West Allis, Racine, and Kenosha—with meat packing and manufs. of automobiles and parts, machinery, fabricated metal products, and beer. There are plants for canning vegetables and fruits in many places. W. has 6300 m. of railways, 86,300 m. of roads, and 169 airports. It has 2 U.S. senators and 10 congressmen. The governor and the 100 state assemblymen are elected for terms of 2 years, the 33 state senators for 4 years. The first French explorer was Jean Nicolet, at Green Bay in 1634. Fur traders and missionaries followed; the first permanent mission was estab. a few miles up the Fox R. from Green Bay in 1671, and the first permanent settlement at Green Bay in 1701. England took W. with the rest of New France in 1763, and ceded it to the U.S.A. in 1783. It became a state in 1848. Among W. educational institutions are the univ. of W. at Madison (established 1848), with 14,000 students, and W. Inst. of Technology at Platteville. Pop. 3,434,600. The largest city is Milwaukee (637,400); other important cities are Madison (the state cap., 96,100), Racine, Kenosha, Green Bay, La Crosse, Sheboygan, and Oshkosh. See R. G. Thwaites, *Wisconsin*, 1908; C. McCarthy, *The Wisconsin Idea*, 1912; E. A. Fitzpatrick, *Wisconsin*, 1928; Federal Writers' Project, *Wisconsin: A Guide to the Badger State*, 1941.

2. Riv. of Wisconsin, U.S.A., 430 m. long, rising in the lake area near the Michigan boundary, and flowing S. and SW. to the Mississippi R. 60 m. below La Crosse. The Portage Canal connects it with Fox R. and Lake Michigan. On it are the famous Dells of the W. and many hydro-electric plants.

Wisden Cricketers' Almanack, ann. handbook dealing with cricket and cricketers. It was first issued in 1864 by John Wisden (1826-84), a cricketer and sports outfitter. It records all scores, averages, and descriptions of first-class matches played in the preceding year and all overseas tours of the penultimate season. There are summaries of important public-school and second-class co. matches. Historical details and statistics cover every aspect of the game, and other articles include the *Five Cricketers of the Year*.

Wisdom, Norman (1920-), actor, comedian, and vocalist. *b.* London, married Freda Simpson. He served in the Army and made his first stage appearance at Collins' Music Hall in 1946 as a comedian. He continued in variety and concert parties and in pantomime, and appeared in a revue at the Cambridge Theatre, *Sauce Piquante*, 1950. His rise to fame was speedy, and he never looked back. He has starred at the London Palladium in revue and in pantomime and also in big ice shows. He entered films in 1953, and has also done much broadcasting and television work. He has a good singing voice, and his strength is that he is the poor, downtrodden little man with the big heart and determined will—a character always popular. He is also an accomplished tumbler.

Wisdom, Book of, see ECCLESIASTICUS; PROVERBS, BOOK OF; SOLOMON, THE WISDOM OF.

Wise, Thomas James (1859-1937), book collector, bibliographer, and forger. His extensive forgeries of 'rare originals,' perpetrated over a period of 20 years, were exposed in 1934 by John Carter and Graham Pollard (see their *Enquiry into the Nature of Certain Nineteenth Century Pamphlets*, 1934). W. achieved great fame as a book collector, and his Ashley Library, catalogued in 11 vols., is now in the Brit. Museum. This collection of the works of the Eng. poets formed the basis for his numerous bibliographies ranging from Wordsworth to Conrad, still of great value as works of reference. See W. Partington, *Thomas J. Wise in the Original Cloth*, 1947. See also LITERARY FORGERY.

Wiseman, Nicholas Patrick Stephen (1802-65). Rom. Catholic prelate. *b.* Seville. His father was descended from an ant. Eng. family, but had settled as a merchant in Waterford. W. was educ. for the priesthood at Ushaw and in Rome, and became rector of the Eng. college at Rome. He was nominated first Archbishop of Westminster and cardinal in 1850 on the re-estab. of the Rom. Catholic hierarchy in England by Pius IX. He was a distinguished scholar, and as such had a special sympathy with the writers who inaugurated the Oxford movement (q.v.). It was an essay of W.'s on the Donatists (q.v.), in the *Dublin Review*, of which he was one of the founders, which first shook Newman's belief in the soundness of his Anglican position. See lives by W. Ward, 1897, and D. Gwynn, 1929.

Wishart, George (c. 1513-46), Protestant martyr and reformer. He was early accused of heresy in Scotland, and then travelled on the Continent. He returned to Scotland (1543), preaching Lutheran doctrines and found ardent supporters. Through the enmity of Cardinal Beaton W. was arrested at Ormiston (1545), and burnt at St Andrews on a charge of heresy.

Wishaw, in Lanarkshire, Scotland, 3 m. from Motherwell, with which it became amalgamated to form a joint burgh in 1920. There are blast furnaces, iron and

steel engineering, and railway wagon works. Preserves, confectionery, and textiles are manufactured. Pop. (with Motherwell) 69,600.

Wisia, see VISTULA.

Wisley (and W. Common and Lake), beauty spot in Surrey, England, between Cobham and Ripley, in which the Fellows' garden of the Royal Horticultural Society is situated.

Wissembourg (Ger. Weissenburg), Fr. tn, cap. of an arron., in the dept of Bas-Rhin, on the Lauter. It was a free Ger.

has remained, but the singular form has changed its sense to quickness of mind, thence to the power of joining ideas in an unusual and humorous way, until now W. is almost synonymous with humour and satire. Strictly speaking, it is not essentially humorous; Hazlitt remarked that lying was a species of W. It is the power to make an intelligent remark arising out of the situation or circumstance; the fact that such apt remarks are usually humorous has led to the narrower meaning, i.e. humorous repartee.



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THE LAKE, WISLEY GARDENS, SURREY

city until the end of the 17th cent., when it was ceded to France. The first battle of the Franco-Prussian War was fought here, when the Crown Prince of Prussia defeated the greatly outnumbered Fr. troops under Gen. Douay. There was bitter fighting here in the Second World War (see WESTERN FRONT IN SECOND WORLD WAR). There are hosiers and leather manufs. Pop. 4800.

Wisteria, genus of leguminous climbing plants, including *W. sinensis*, the Chinese kidney bean, a popular variety grown on walls, trellis, or garden arches. It has silky, pinnate leaves, and deep lilac flowers in long racemes in May; *W. floribunda* has a white form; and *W. venusta* bears white flowers.

Wit (O.E. *witan*, to know), originally meant simply intelligence and the power to know. In the plural, this meaning

Since the time of Pope, England has been rich in recorded and transcribed W., from Boswell's meticulous reporting of Johnson to the many legends built around Bernard Shaw.

Witangemot (Saxon, *witan*, to know, and *gemot*, assembly), in A.-S. times the national Council, consisting of members of the royal family, the archbishops, bishops, abbots, ealdormen, and king's thanes. Its origin is obscure. Stubbs considered that it derived from the Teutonic assembly of freemen described by Tacitus, but this view has been challenged by more modern historians. The *de jure* powers of the W. were very great, but were practically limited by a strong king or ruling clique.

Witch Doctor, or Medicine Man, a practitioner devoted to combating evil, witchcraft, and sickness, found in many

primitive societies throughout the world. He is usually trained with long and elaborate initiation.

Witch-Hazel, genus *Hamamelis*: specifically *H. virginica*, N. Amer. shrub resembling the hazel. It is a shrub between 8 and 12 ft high, with oval leaves and clusters of yellow flowers, blooming in autumn and winter, whence the alternative name Winter Bloom. The bark and leaves have an astringent property useful in medicinal preparations.

Witchcraft includes, broadly, any claim to a power to produce effects by compact with a supernatural power. In Europe W. cults may go back to a fertility cult or group of cults indigenous to Europe since palaeolithic times, its chief festivals being held at Candlemas, May Eve, Lammas, and Nov. Eve. The few direct accounts of its ritual which survive show that a horned god symbolising the fertility of cattle, sheep, goats, or occasionally deer was venerated, and that the local leader of the cult impersonated, and was regarded as the incarnation of, this god. This explains Christian traditions of a 'devil' with horns and tail. Such ceremonies are depicted in the palaeolithic cave-murals of Altamira, Arlège, etc. The object of the seasonal rites was probably to promote fertility by sympathetic magic. In the course of time the original cult received the accretion of discarded beliefs from other cults which tended to obscure its origins. At times it appears to have coalesced with Christian heresies (e.g. certain deviations of the Catharists) and occasionally to have attracted distinguished followers from the ruling Christian class. Possible examples are Wm Rufus and Gilles de Rais, the patron of Joan of Arc (who was accounted a witch).

By the time of the Reformation, W. had assumed the form of a secret society organised in 'covens' or groups of 13 members of both sexes, of which the leader was always a man. By this time it is unlikely that there were many people who believed in the cult; and what had once been a serious enemy of the Church now remained only as a convenient scapegoat, both religious and political. As members of a secret society 'witches' could equally easily be denounced on charges of treason, heresy, or demonolatry. Eng. laws against witches are known from the time of Canute, and eccles. and secular courts had concurrent jurisdiction in cases of W. The former punished by penance and fine up to 1542, when W. was made a common felony (it was already indictable at common law). Written evidence concerning W. trials as far back as the Middle Ages is copious but must be read with extreme care. Very frequently it was taken down by persons who did not understand the implications of what the accused and witnesses said. The earliest reported trial in England before a secular court was in 1324: in that year occurred the famous trial before the Bishop of Ossory of Dame Alice Kyteler (consult report by Thomas Wright in the pubs. of the Cam-

den Society). Apart from the statutes passed in 1542 and 1562, the Act of 1601, defining and prescribing the punishment for W., remained the prin. Act concerning W. up to the Act of 1736. Under all these Acts the prosecution had to prove that injury to person or property had been done or attempted (but not in the case of love philtres), or that gain had been made. Trials for W. were most numerous in the 17th cent., when the final crisis of W. in Britain took place.

In the hundred years following the accession of James I (himself a devout believer in 'Demonologie') a profound change in the attitude of the educ. classes towards 'witches' occurred, which can best be indicated by saying that whereas a humane and intelligent justice under Elizabeth I could condemn a proven 'witch' to the stake or the pillory for a crime against God and man, a humane and intelligent justice under Anne would on the same evidence either dismiss the case or sentence her to prison for a special type of fraud. The most instructive case reported in the *State Trials* is that of the Suffolk witches at Bury St Edmunds in 1664-5 (consult *State Trials*, vol. vi, p. 647).

By the time of Queen Anne, organised 'covens' of witches had ceased to exist, and the public attitude towards them became less violent, not so much because people became more enlightened as because the element of fear had diminished, the surviving witches being so obviously both mentally and physically impotent for good or harm. The last recorded conviction in England was that of Jane Wenham of Walkern in Herts (1712), but a woman was actually burned alive in Sunderland as late as 1722. As the law now stands any person pretending to use W., tell fortunes, etc., may under the Act of 1736 be imprisoned for a year. Proceedings may also be taken under the Vagrancy Act of 1824 (see VAGRANTS).

W. today is found flourishing in many societies, and especially those we call 'primitive.' Modern anthropological studies of W. have shown that witches may not exist in reality, but what is important socially is the belief and the accusations of W. made by one man against another. Witches bewitch those against whom they bear a grudge and against whom they cannot, for one reason or another, bring the ordinary processes of law to act. A man usually believes that his bewitcher is one who is generally disliked, who is a deviant from everyday social behaviour, who is exceptionally wealthy or successful, who has cause to bear grudges. An accusation of W. is a way of personalising misfortune; the accuser then knows how to act against his misfortune, by killing or punishing a supposed witch or by bewitching him in his turn by white magic. In many societies witch-doctors are used to fight against W., and are therefore seen as devout helpers of the social good. An excellent description is given in E. E. Evans-

Pritchard's *Witchcraft, Oracles and Magic among the Azande*, 1937.

See also MAGIC. See R. Scot, *Discoverie of Witchcraft*, 1584; Ponzinibius, *De Lamiis*, 1592; Wierus, *De Lamiis*, 1577-79; H. Roquet, *Discours des sorciers*, 1603; Gaucolus, *Compendium de Maleficiis*, 1626; T. Potts, *Discovery of Witches in the County of Lancashire*, 1845; Margaret A. Murray, *The God of the Witches*, 1921, 1952, *The Witch Cult in Western Europe*, 1933, and *The Divine King in England*, 1954; H. Ross Williamson, *The Arrow and the Sword*, 1947; R. Trevor Davies, *Four Centuries of Witchcraft Beliefs*, 1947; R. Graves, *The White Goddess*, 1948; P. Hughes, *Witchcraft*, 1952.

Witham: 1. Tn and urb. dist. of Essex, England, on Brain R. There are anct earthworks round the church of St Nicolas, which contains interesting monuments. Industries include the manuf. of metal windows, gloves, fruit juices, and feeding stuffs; there is milling, seed-growing and malting. Pop. 6200.

2. Riv. rising in Rutland, England. It flows past Grantham and Lincoln, and then S.E. past Tattershall and Boston into the Wash above Welland R.

Wither, or Withers, George (1588-1667), poet, b. near Alton, Hants. Educ. at Oxford, he studied law at Lincoln's Inn. In 1613 he pub. a bold satire, *Abuses Script and Whipt*, which earned him imprisonment in the Marshalsea. While there he wrote *The Shepherd's Hunting*, a pastoral. *Wither's Motto* was written in 1618, and in 1622 he collected his poems as *Juvenilia*. In the same year he pub. a long poem, *Faire Virtue, the Mistress of Philarete*, in which appears the famous lyric 'Shall I wasting in despair.' He joined the parl. side in the Civil war, and at the Restoration was imprisoned for a time. In his later years he wrote many religious poems.

Withering, William (1741-90), physician, b. Wellington, Shropshire, graduated in medicine at Edinburgh, 1766, and practised at Stafford and later at Birmingham. He learned from an old woman her secret recipe for dropsy; its principal constituent was the foxglove, *Digitalis purpurea*. He began to use the remedy in his practice and after 10 years pub. *An Account of the Foxglove, and Some of its Medical Uses*, 1785; facsimile reprint, 1948. Before his time digitalis was occasionally mentioned, but it was due to W. that its action in dropsy and on the heart became generally recognised; it is now one of the most important remedies in certain heart diseases. W. also wrote an important botanical work, *A Botanical Arrangement of all the Vegetables Naturally Growing in Great Britain*, 1776-92, and a treatise on scarlet fever, 1779. See life by T. W. Peck and K. D. Wilkinson, 1950.

Withington, residential dist. of Manchester (q.v.).

Witness, see EVIDENCE; OATH.

Witney, mkt. tn and urb. dist. of Oxon, England, on the Windrush, 10 m. from Oxford. It is famous for blanket making. It also manufs. gloves and other

woollen goods. Among its fine public buildings are a 13th-cent. cruciform church (restored 1867), the grammar school (1683), and Blue Coat School (1723). The small roofed open-air shelter known as the Butter Cross which stands close to the tn hall replaces the old Butter Cross which formerly stood on this site. An inscription on it states that it was erected in 1683 by Wm Blake, a Cogges gentleman. It was provided with a sundial which is still there. A clock has been added more recently. See hist. of W. by J. A. Giles, 1852, and W. J. Monk, 1894. Pop. 7000.

Witt, Cornelius, and Jan De, see DE WITT.

Witte, Sergey Yul'yevich, Count (1849-1915), Russian statesman of Ger. origin. He made a successful career as a railway manager, in 1892 became minister of transport, and from 1892 to 1903 was minister of finance, greatly stimulating the industrial development of Russia through protectionist tariffs, large foreign loans, extensive railway construction, etc. From 1903 to 1906 he was Prime Minister. He negotiated the Portsmouth peace treaty with Japan, and suggested to Nicholas II (q.v.) the granting of a constitution providing for a legislative Duma (see DUMA; REVOLUTION OF 1905). A moderate conservative, W. incurred the suspicion of both the Liberals and the extreme Right, including the emperor, who suddenly dismissed him. Later, as an independent member of the State Council, W. opposed Stolypin (q.v.), though the latter was largely continuing his own policy.

Wittenberg, Ger. tn in the dist. of Halle, on the Elbe (q.v.), 40 m. N.E. of Halle (q.v.). It was the cap., 1273-1422, of the duchy of Saxe-W. It was one of the strongholds of the Reformation (q.v.), and it was on the door of its 15th-cent. Schlosskirche that Luther (q.v.) nailed his 95 Theses on 31 Oct. 1517; in 1520 he publicly burnt in W. mkt.-place the papal bull which condemned him. The univ. of W., founded in 1502, was incorporated with the univ. of Halle in 1817. There are sev. anct houses, including those of Luther, Melancthon, and Lucas Cranach (qq.v.). Paper, machinery, chemicals, and foodstuffs are produced. Pop. 40,000.

Wittenberge, Ger. tn in the dist. of Schwerin, near the Elbe (q.v.), 45 m. S.S.E. of Schwerin (q.v.). It has textile, rolling-stock, and oil industries. Pop. 30,000.

Witwatersrand, full name of the dist. in the Transvaal, S. Africa, known for its goldfields, usually known as the Rand (q.v.). It is also more exactly applied to the area which contains the gold reefs, meaning Ridge of White Waters.

Witworth, Matthew, see ATLMER, BARON.

Witz, Konrad (c. 1395-1447), Swiss painter, b. Rottweil, son of a painter employed by the Duke of Burgundy. He went with his father to France and Flanders and was influenced by the Burgundian school. He worked mainly at Basel, where one of his famous altar-

pieces remains; he is also noted for his 'Miraculous Draught of Fishes', 1444 (Geneva), in which the landscape background is said to be the earliest European rendering of a real, and still existing, view.

Wiveliscombe, mkt tn and par. of Somerset, England, 11 m. from Taunton (q.v.). There are ruins of a 14th-cent. episcopal palace. It is an agric. centre. Pop. 1200.

Woad, or *Isatis tinctoria*, cruciferous herb, with yellow flowers and pendulous pods. It was formerly cultivated extensively for the blue dye which it yields by fermentation of the leaves, and is still grown to a small extent. The dye was used by the anc. Britons.

Woburn: 1. Mkt tn of Beds, England. It contains Woburn Abbey, the seat of the Earls and Dukes of Bedford (since 1547), on the site of a Cistercian abbey (1145), the present building dating from 1744. The abbey stands in W. Park, and has a valuable art collection. Straw-plaiting was formerly carried on here. Pop. 950.

2. City of Middlesex co., Massachusetts, U.S.A., 10 m. from Boston. Manufs. include leather, chemicals, fertiliser, food products, and machinery; floriculture is also practised. Pop. 20,490.

Woburn Sands, par. of Buckinghamshire, England, 4 m. N.E. of Fenny Stratford, in the rural dist. of Newport Pagnell. It stands 500 ft above sea-level on sandy, pine-covered hills, and is a well-known health resort. Pop. 1500.

Wodehouse, John, see **KIMBERLEY**, JOHN WODEHOUSE, first EARL OF.

Wodehouse, Pelham Grenville (1881-), novelist, b. Guildford, Surrey. Educ. at Dulwich College, he worked for 2 years in a bank. An early success was *Piccadilly Jim*, 1918, but he became most famous through his creation of Jeeves, the 'gentleman's personal gentleman,' who appears in many books, including the *Jeeves Omnibus*, 1931. Among his best are *Leave It To Psmith*, 1923, *Ukridge*, 1924, *Sam the Sudden*, 1925, *The Small Bachelor*, 1927, *Summer Lightning*, 1929, *Lord Emsworth and Others*, 1937, *Full Moon*, 1947, and *Pigs Have Wings*, 1952. W.'s humour is farcical rather than satirical. He also wrote lyrics for many musical comedies. In 1955 he became an Amer. citizen.

Woden, see **ODIN**.

Woerth (Ger. *Wörth*), Fr. vil. in the dept of Bas-Rhin, on the Sauer, site of a Fr. defeat in 1870 (see **FRANCO-PRUSSIAN WAR**). Pop. 1200.

Woestijne, Karel Van de (1878-1929), Flem. author b. Ghent. At first a journalist, he became prof. at Ghent in 1919. He is one of the outstanding modern poets of the Low Countries. There is a clear influence of the Fr. symbolist movement, especially in his early works. His autobiographical vols. of verses, including *Hel Vader-Huis*, 1903, *De Gulden Schaduw*, 1910, *De Modderen Man* (1920), *God aan Zee*, 1926, and *Hel Bergmeer*, 1928, are sensitive analyses of his tortured soul transposed to the human plane. Some

of his lyrical prose has been trans. into French, German, and English. His collected works were pub. in Brussels in 1947. See study by U. van de Voorde, 1934; G. van Severn, *K. v. de Woestijne*, 1944; A. Westerlinck, *De psychologische figuur van K. v. de Woestijne*, 1952.

Woffington, Margaret, or Peg (c. 1714-60), Irish actress, b. Dublin. She played in Dublin from 1732 to 1740. Her London début was at Covent Garden under Rich in *The Recruiting Officer*, 1740. She excelled in comedy as a lady of high rank (Lady Plyant, Lady Betty Modish, Millamant, etc.), but also acted in tragedy. See C. Reade, *Peg Woffington*, 1853. See also life by J. A. Dally, 1888.

Wöhler, Friedrich (1800-82), Ger. chemist, b. Eschersheim. He studied medicine at Marburg and Heidelberg, completing his chemical studies under Berzelius (q.v.) at Stockholm. From 1836 he was prof. of chemistry in the medical faculty of Göttingen Univ. His discovery of cyanic acid and the preparation of urea from it was his first entry into the realm of organic chemistry. His researches in conjunction with Liebig (q.v.) on cyanic and cyanuric acid founded the theory of isomerism; their joint work led to the discovery of the benzoyl radical. W.'s work on another side led him to the isolation of the elements aluminium, beryllium, yttrium, and titanium. For the philosophical importance of Wöhler's work in relation to the 'Vital Force' theories of the 18th and 19th cents, see **UREA**. Amongst his writings are: *Grundriss der unorganischen Chemie*, 1831; *Grundriss der organischen Chemie*, 1832; and *Praktische Übungen in der chem. Analyse*, 1854. See memorial study by A. Hofmann, 1888.

Wöhler Test, see **METAL TESTING**.

Woking, urb. dist. of Surrey, England, largely residential, with many ac. of commons and parks. There is a Muslim Mission and Literary Trust, which includes a mosque (1889). The dist. consists of a number of attractive vils.: Brookwood (widely known for the London Necropolis Cemetery), Byfleet, Horsell, Knaphill, Old Woking, and Pyrford. Near by are the ruins of the Early Eng. Newark Priory. There are printing and light industries. W. is a parl. constituency. Pop. 52,780.

Wokingham (Oakingham or Oekingham), municipal bor. of Berkshire, England, chief forest tn of Windsor Forest, and a mkt centre for over 700 years. There are an anc. par church, a Gothic hall (1860), and the famous Rose Inn, where Pope, Swift, Gay, and Arbuthnot composed the ballad of *Molly Bagg*. Some of the almshouses date from 1451. W. was noted for bull-baitings till about 1821. Pop. (estimated) 8000.

Wolcott, John (1738-1819), satirist, b. near Kingsbridge, Devon. He studied medicine at Aberdeen Univ. He wrote satires and lampoons under the pseudonym of 'Peter Pindar,' which were popular in their day.

Wold, term applied to open, hilly

country. It is used specifically of certain areas in England to which this description applies, e.g. Yorkshire Wolds, Cotswolds.

Woldingham (Surrey) Convent of the Sacred Heart, Catholic boarding school for girls, formerly at Roehampton. It is staffed by Religious of the Sacred Heart.

Wolf, Friedrich August (1759-1824), Ger. classical philologist and critic, b. Hagenrode; prof. at Halle in 1783 and at Berlin in 1810. He is best remembered for his *Prolegomena ad Homerum*, 1795, in which he denied the unity of Homeric authorship. See O. Kern, *Friedrich August Wolf*, 1924.

Wolf, Hugo (1860-1903), Austrian composer, b. Windischgraz. He studied at Vienna Conservatory, where he made the acquaintance of Gustav Mahler. His life was outwardly uneventful but very restless, and was passed in great poverty. W. wrote an opera, *Der Corregidor*, 1895, but it was a failure; and his 2 choral works with orchestra, *Die Christnacht* and *Der Feuerreiter*, are seldom heard; but he is justly famous for his splendid songs, which number over 200, including musical settings for poems of Goethe, Eichen-dorff, Mörike, and other poets. They rank with the supreme examples of the Ger. Lied. W. d. insane. See lives by E. Newman, 1907; K. Grunsky, 1928; A. Orel, 1947; Frank Walker, 1951.

Wolf, Maximilian Franz Joseph Corneli-us, always known as Max Wolf (1863-1932), Ger. astronomer, b. Heidelberg. He studied at Heidelberg and later Stockholm, where he took mathematical astronomy under Gylden. While still a student he discovered in 1884 the comet that now bears his name. He was the first to apply photography to the discovery of asteroids, and about 1300 of these bodies were found by him. His photographs of the Milky Way, his discovery of many nebulae, including a cluster of 108 faint nebulae in the constellation of Coma, and of another group in Virgo, of the absorbing interstellar matter, of variable stars, and a temporary star in Aquila in 1927, made him famous.

Wolf, Rudolf (1816-93), Swiss astronomer, b. Zürich. He is famous for his work on sunspot cycles. He confirmed the work of Schwabe (q.v.) on the 11-year period, and afterwards fixed it more accurately at 11.1 years. The Wolf Relative Number Curve has proved very useful.

Sunspots (q.v.) occur in groups. If at any time there are g such groups, and there are, all together, f individual spots, then W.'s relative number is

$$r = k(10g + f)$$

where k is a constant which varies from observatory to observatory. For each observatory k has a fixed value. For the Mount Wilson Observatory (q.v.), California, U.S.A., $k = 0.5$. The W. number r is plotted against time and gives an indication of the sunspot activity. This activity is found to be cyclic.

Wolf. The various species of W. are included with the dogs, jackals, and foxes in the genus *Canis* of the family *Canidae* in the order *Carnivora*. The W.s, dogs, and jackals are all closely similar, and are distinguished from the foxes by some characteristics of the skull. The European W., *Canis lupus* (*Lupus vulgaris*) was widespread in Great Britain in Saxon times; it persisted in England until the reign of Elizabeth I, and even later (1743) in Scotland and (1770) in Ireland. Its present distribution is Europe, N. Asia, and N. America. Other W.s are *Canis pallipes* of India, *Lupus mexicanus* of the S. states of N. America, and *Lyciscus caagottus*, the cayote of Mexico. The Dingo, *C. dingo*, is a destructive W. or dog of Australia; whether it is indigenous or was introduced by the natives is not known with certainty. The Prairie W. or Coyote is *C. latrans*; the jackals are *C. aureus* and *C. anthus*.

Wolf, Tasmanian, see THYLACINE.

Wolf Cubs, see BOY SCOUTS.

Wolf-Ferrari, Ermanno (1876-1948), Ger.-It. composer, b. Venice and educ. at Munich, where he settled (1909). He is the composer of sev. successful operas, including the realistic *I gioielli della Madonna*, 1911, and *Sty*, 1927, which throws a new psychological light on the induction of *The Taming of the Shrew*; but it was the light and graceful *Il segreto di Susanna*, 1909, and comic operas based on Goldoni, *Le donne curiose*, 1903, *I quattro rusteghi*, 1906, *Gli amanti sposi*, 1925, *La vedova scaltra*, 1931, and *Il campiello*, 1936, which found favour both in Germany and Italy.

Wolf-fish, or **Sea-wolf**, see ANARRHICHAS.

Wolf Rock, rock about 117 ft high, 8 m. from Land's End, Cornwall, England, with a lighthouse.

Wolfe, Charles (1791-1823), clergyman and poet, b. Dublin. Educ. at Winchester and Trinity College, Dublin, he became rector of Donoughmore. He is remembered for one short but universally admired poem, 'The Burial of Sir John Moore.'

Wolfe, Humbert (1885-1940), Brit. poet and critic, b. Milan of Jewish descent. Educ. at Bradford Grammar School, and Wadham College, Oxford, he entered the Civil Service in 1908 and was prin. assistant secretary at the Ministry of Labour from 1918. He was made C.B. in 1925. His poetic works include *Kensington Gardens*, 1923, *The Unknown Goddess*, 1925, *Humoresque*, 1926, *News of the Devil*, 1926, *Requiem*, 1927, *The Silver Cat*, 1928, *The Blind Rose*, 1928, *The Uncelestial City*, 1930, and *Kensington Gardens in War Time*, 1940.

Wolfe, James (1727-59), soldier, b. Westerham, Kent, and educ. at Greenwich. He joined the Army in 1741, he and his brother, Edward, taking part in the battle of Dettingen (1745). In 1745 W., now a lieutenant, was sent to Scotland under Cumberland to assist in crushing the rebellion in support of the Young Pretender. During the Seven Years' War W. had charge of Britain's operations in

America under Amherst. In 1758 the task was assigned to W. of taking Louisbourg, and this he accomplished successfully in July. In 1759 he was given the command of the expedition against Quebec, and on 26 June began the 12 weeks' siege. The first attempt at assault on 31 July failed. Later, by distracting the attention of the French by surprise attacks in other quarters, and by using an unguarded path, W. in a night assault succeeded in placing an army on the heights called the Plains of Abraham. Marquis de Montcalm, the Fr. commander, at once gave battle. The English were victorious, and W., 3 times wounded, died in the hour of victory. See lives by B. Willson, 1909; E. Solmon, 1909; W. T. Waugh, 1929; F. E. Whitton, *Wolfe and North America*, 1929. See also CANADA; SEVEN YEARS' WAR.

Wolfe, Thomas Clayton (1900-38), Amer. novelist, b. Asheville, N. Carolina. Educ. at the univ. of N. Carolina and Harvard, he was instructor in Eng. at New York Univ. from 1924 to 1930. He started writing while on a visit to England in 1926, his work being largely based on his own experiences; it was most voluminous, and called for much pruning and editing. Look *Homeward, Angel*, 1929, had a great reception, and was followed by *Of Time and the River*, 1935, *The Web and the Rock*, 1939, and *You Can't Go Home Again*, 1940. All these novels display great power and realism, while *The Story of a Novel*, 1936, is an intimate study in self-analysis. W.'s *Letters to his Mother* were pub. in 1943. See studies by H. J. Muller, 1947; Pamela H. Johnson, 1947; R. Walser, 1953; T. C. Thomas and O. Cargill, 1954.

Wolffenbüttel, Ger. tn in the *Land of Lower Saxony* (q.v.), on the Oker, 7. m. S. of Brunswick (q.v.). It was formerly the seat of a branch of the ducal family of Brunswick, and was the scene of a Swedish victory over the Austrians during the Thirty Years War (1641). There are fine old churches and houses, and a castle (1670-1691). The library, in which Lessing (q.v.) worked, is rich in MSS. The chief industry is canning. Pop. 35,000.

Wollenden, Sir John Frederick (1906-), educationist, b. Halifax, educ. at Wakefield School and Queen's College, Oxford. In 1934 he became headmaster of Uppingham School, and in 1944 went as headmaster to Shrewsbury School. In 1941 he was director of pre-entry training at the Air Ministry. He was appointed vice-chancellor of Reading Univ. in 1950 and was knighted in 1956. In the same year he was appointed chairman of the Departmental Committee on Homosexual Offences and Prostitution; the so-called W. Report was pub. in Sept. 1957.

Wolfgang, St (924-994), Ger. Benedictine monk and missionary, b. Swabia and educ. at Reichenau Abbey. He became a Benedictine at Einsiedeln, and made the abbey school there famous. In 972 he became Bishop of Ratisbon. He restored abbey, raised the standard of education, and reformed eccles. discipline.

W. was canonised in 1052; his feast is on 31 Oct.

Wolfhound, Irish, see IRISH WOLF-HOUND.

Wolfhound, Russian, see BORZOI.

Wolfit, Sir Donald (1902-), actor-manager, b. Newark-on-Trent. He began his career as a touring actor, and was for some time with Fred Terry and Julia Neilson. He also gained much experience with Matheson Lang. An actor of great power and force, he found his best outlet in the tragedies of Shakespeare and the Gk drama, and founded his own Shakespearean company, touring it for years with success. He is the finest exponent of the part of 'Lear' the stage has seen for many years. He has also made many successful films. He is almost the last exponent of what is called the grand manner, and his work is both powerful and compelling. Knighted in 1957.

Wolfram von Eschenbach (c. 1170-c. 1220), Ger. poet, b. of a noble Bavarian family. Little is known of his life, except that he lived at the court of Hermann of Thuringia. He is one of the greatest medieval Ger. poets, possessing a great sense of humour, and an unusual erudition, although he professed to be a knight and not a scholar. His most famous work is the courtly romance *Parzival*, c. 1200-10, a deep, philosophical interpretation of the Holy Grail. He also wrote lyrics of great beauty; an incomplete romance *Willehalm*, c. 1212-5; and fragments of *Titurel*. His works have been ed. by Lachmann-Hartle, 1930, and Leitzmann, 1900-3, and trans. by J. Weston, 1894. See life by G. Weber, 1928; B. Mergoll, *Wolframs Parzival*, 1943.

Wolframite, mineral from which the metal tungsten (q.v.) is extracted. Chemically it is a mixture of iron and manganese tungstates, (FeMn)WO₄. It occurs in dark-brown to black crystals with yellow-brown to black streaks and is widely distributed, the chief localities being the U.S.A., Malaya, and Spain.

Wolf's Bane, see ACONITUM.

Wolfville, tn in King's co., Nova Scotia, Canada, 18 m. NW. of Windsor. W. is a centre for a rich mixed farming and fruit-growing area, and the site of Acadia Univ. Pop. 2313.

Wolgemuth, Michael (1434-1519), Ger. painter, b. Nuremberg. He was the leader of the Nuremberg school, which was largely a factory for the manu. of altar-pieces. W.'s pupil, Dürer, was the only artist of note to issue from his studio.

Wollaston, William Hyde (1766-1828), natural philosopher and chemist, b. E. Dereham, Norfolk, educ. Charterhouse. He took his medical degree at Caius College, Cambridge, and practised at Bury St Edmunds. Later he turned his attention to chemistry, particularly in connection with platinum, palladium, and rhodium, and to optical invention. He received the medal of the Royal Society, of which he was elected fellow in 1794, for his method of manufacturing platinum and rendering it available for

instruments (particularly crucibles). He is noted as the inventor of the camera lucida, the goniometer and the cryophorus (qq.v.), and for the discovery of dark lines on the solar spectrum, 1802, now known as Fraunhofer lines (q.v.).

Wollongong, city of New S. Wales, Australia, situated on the coast about 51 m. S. of Sydney. It is the prin. residential area and business centre of the Illawarra dist. (q.v.). There are sev. rapidly expanding industries in the neighbourhood, including iron and steel, copper, fertilisers, oxygen and acetylene, boat building, and coal mining. Greater W., which includes Port Kembla (q.v.), has a total pop. of 95,830.

Wollos, see **GALLAS**.

Wollstonecraft, Mary, see **GODWIN**.

Wolseley, Garnet Joseph Wolseley, Viscount (1833-1913), soldier, b. Golden Bridge, co. Dublin, of an old Staffordshire family. He was educ. privately and entered the Army in 1852. A long career of active service commenced with the Burmese War of 1853. He served in the Crimea, with the 90th Light Infantry. He was present at the relief of Lucknow and at other engagements in the Indian mutiny, becoming lieut.-col. at the close of the war. He commanded the Canadian Red R. expedition of 1870, and took part in the Ashanti War of 1873, receiving the thanks of Parliament. In Egypt he won the Battle of Tel-el-Kibir in 1882, and commanded the expedition which attempted to relieve General Gordon in 1884-5. He was made Adjutant General in 1885 and initiated an active reform policy. (He was the prototype of Gilbert's 'Modern Major General' in *The Pirates of Penzance*.) He became commander-in-chief in Ireland in 1890, was made F.-M. in 1894, and from 1895 till 1900 was commander-in-chief of the forces. Viscount, 1885. His last years were clouded by mental illness. See his *Story of a Soldier's Life*, 1903; Maj.-Gen. Sir F. Maurice, *Life of Lord Wolseley*, 1924.

Wolsey, Thomas (c. 1475-1530), cleric and statesman, b. Ipswich, the son of a grazier, and said to have been educ. at Magdalen College, Oxford. He took holy orders, was presented to the living of Limington in 1500, and in the next year was appointed domestic chaplain to Henry Deane, Archbishop of Canterbury. Henry VII made him one of his chaplains in 1507, and preferments followed rapidly. He was made dean of Lincoln in 1509, canon of Windsor in 1511, dean of Hereford in 1512, and of York the next year, Bishop of Lincoln in 1514, and later in the year Archbishop of York. Leo X. created him a cardinal in 1515. He had for some time been in the confidence of Henry VIII and had been consulted by the king on temporal matters. It was said that his magnificence outshone the king's, and that, as lord chancellor, he made the Star Chamber more important than the king's court; but in fact it seems that he was always the adviser, and never the dictator, of the young monarch. He directed the plan of campaign against

France in 1512, arranged the treaty of 1512 with that country, and accompanied Henry to the Field of the Cloth of Gold. In 1520, when Charles V became Holy Roman Emperor, W. reversed his policy of alliance with France, and in 1521 entered into an alliance with Charles against Francis, who was defeated at Pavia. W.'s policy was in fact purely opportunist, the constant factor being his wishes to make Eng. influence felt abroad, and to satisfy his own ambition by gaining the papal throne, in which position he would also be able to influence international events in England's favour.

Though opposed to Anne Boleyn, W. conducted negotiations with Clement VII for the annulment of Henry's marriage with Catherine of Aragon (1527) and sat as a judge at the hearing with Campeggio. His failure to solve this question satisfactorily led to his fall from favour. He was indicted in 1529, but pardoned the following year. In the last year of his life he was arrested for high treason, and died on his way to London to refute the charge. W. was undoubtedly arrogant and avaricious, while his diplomatic triumphs were short-lived and gained at immense cost. He was, however, a good organiser, and dispensed justice in his courts with a fairness which won him enemies among the rich. He was a patron of learning: his foundation, Cardinal College, at Oxford, became Christ Church. Though personally worldly, he attempted to make administrative reforms in the Church, and, after his fall from power, administered his diocese of York carefully and well. See lives by M. Creighton, 1888, and A. F. Pollard, 1929.

Wolsingham, tn of co. Durham, England, in an agric. dist., it has steel works and stone quarries. Pop. (estimated) 3000.

Wolstan, see **WULFSTAN**, ST.

Wolstanton, see **NEWCASTLE-UNDER-LYME**.

Woluwe-Saint-Lambert (Flem. **Sint-Lambrechts-Woluwe**), E. suburb of Brussels, Belgium. Pop. (1955) 32,100.

Woluwe-Saint-Pierre (Flem. **Sint-Pieters-Woluwe**), SE. suburb of Brussels, Belgium. Pop. (1955) 25,700.

Wolverene, see **GLUTTON**.

Wolverhampton (Handone, **Wulfrunahampton**), co. and parl. bor., second largest tn in Staffs, England, 13 m. NW. of Birmingham. St Peter's Church was founded in 994, and certain of its present structure dates partly from the 13 cent. Public buildings include the art gallery and museum, public library, Bantock House museum, W. and Staffordshire technical college, school of art and crafts, and the magnificent civic hall opened in 1938. The grammar school was founded in 1515. W. is referred to as the cap. of the 'Black Country' and is essentially an industrial tn, situated on the edge of a rich agric. area and contiguous to some of the most beautiful countryside in the Midlands. Locks and keys have been a special manuf. from early times, and the tn has a great diversity of industry, including pneumatic tyres, rayon, aircraft and components, trolley buses and com-

merical vehicles, marine, diesel, and petrol engines; also batteries, ball and roller bearings, bicycles, castings, electrical and heavy engineering, machine and edge tools, stampings, forgings, pressings, motor-cycle and car components, hollow-ware, chemicals, and safes and strong-rooms. There are collieries on the fringe of the city. Two members are returned to Parliament. Pop. 161,300. See T. Brennan, *Midland City*, 1949.

'Wolverine State,' see MICHIGAN.

Wolverton, tn of Buckinghamshire, England, near the Ouse, and on the Grand Union Canal. It has railway carriage and wagon shops and printing works. Pop. 5856.

Womb, see UTERUS.

Wombat (*Phascogale*), burrowing marsupial of S. Australia and Tasmania. *P. ursinus*, the ursine W., is about 3 ft long, with a short tail and a clumsy form. It has stout limbs and a blunt muzzle, and the coat is thick with long and coarse brownish-grey woolly hair. The head is large, flat, and broad, and the W. has small eyes and ears; fore-feet with 5 and hind-feet with 4 digits; soles broad and naked. The pouch is more towards the rear of the body than is usual in the marsupials, the young hanging between the hind legs of the mother. The dentition resembles that of the Rodentia. The W. is nocturnal in its habits, feeds on vegetables, digging up roots with its claws.

Wombwell, urb. dist. and tn of the W. Riding, Yorks, England, with extensive coal mines. Pop. 18,800.

Women's Army Auxiliary Corps, see QUEEN MARY'S ARMY AUXILIARY CORPS.

Women's Auxiliary Air Force, see WOMEN'S ROYAL AIR FORCE.

Women's Institutes, organisation of country women for the 'improvement and development of rural life.' The movement is rural and W. I. are normally formed only in communities having a pop. of under 4000. The H.Q. of the National Federation of W. I. gives help and advice through the county federations, while the actual running of the institute is in the hands of the members themselves. The programmes include talks, demonstrations, competitions, and discussions. Meetings are held monthly, and the members decide on their programme of work. In Scotland there is a similar but quite independent organisation, and the title 'Rural Institutes' is used.

Women's Land Army. A W. L. A. was founded during the First World War in 1917 under the Directorship of Dame Meriel Talbot. 18,000 women and girls were enrolled, and undertook all kinds of agricultural work. In May 1939 W. L. A. Co. Committees in England and Wales were appointed by the Minister of Agriculture and Fisheries, and on the outbreak of the Second World War the organisation came into being. It was administered by the Ministry of Agriculture and Fisheries, with Lady Denman, D.B.E., as Honorary Director. The Scottish W. L. A. was administered by the Dept of Agriculture for Scotland. The W. L. A. Organisation was responsible for the recruitment,

training, and placing in employment of Land Girls, for their welfare and accommodation, and for the provision of their uniform. Volunteers were originally enrolled for the duration of the war, and did every kind of agricultural and horticultural work, including forestry. The peak strength of the W. L. A. was 80,000 members in Aug. 1943. At the end of the war the W. L. A. was maintained to provide a labour force during the transition to peace-time conditions. It was disbanded on 30 Nov. 1950.

Women's Royal Air Force (formerly **Women's Auxiliary Air Force**) existed in the First World War as the **Women's Royal Air Force** and was re-formed as the **Women's Auxiliary Air Force (W.A.A.F.)** in June 1939. Three years later the W.A.A.F. had been taught and were performing skilled work in more than 80 trades, in most of which women were never employed before the war. The strength of the force was approximately 182,000 at its highest. It was an integral and indispensable part of the R.A.F. In the summer of 1940 the W.A.A.F. co-operated with the R.A.F. in winning the Battle of Britain. During this battle, women working at the plotting tables or as telephonists at Fighter Stations were exposed to the same dangers as men. The W.A.A.F., which became the W.R.A.F. in Feb. 1949, continued on a voluntary basis as a permanent feature of the armed forces. Women in the R.A.F. can now be employed in 18 out of the 22 trade groups available to men, and officers are commissioned in all branches with the exception of those involving flying duties. (See illustration, p. 638.)

Women's Royal Army Corps, title since Feb. 1949 of the Brit. women's army corps, which came into being as the **Auxiliary Territorial Service** in 1938. By Feb. 1941 some 40,000 women had been enlisted; by Jan. 1942 there were nearly 100,000; and by 1944 some 212,000. Of the women's corps in the Second World War they were the most numerous body. The chief controller had the equivalent army rank of a maj.-gen.: the other ranks, with their equivalent army ranks, were: senior controller (brigadier), controller (colonel), chief commandant (lieut.-col.), senior commandant (maj.), company commander (capt.), junior commander (lieut.), company assistant (second lieut.), senior leader (warrant officer class II), section leader (sergt.), sub-leader (corp.), chief volunteer (lance-corp.), volunteer (private). The women were not directly conscripted, but enlisted through the directive machinery of the Ministry of Labour and National Service. The A.T.S. served in France, Canada, Germany, the W. Indies, Palestine, Egypt, N. Africa, E. Africa, Italy, and Washington. Some 3000 women qualified for the Africa Star. Twenty thousand worked in cookhouses; 30,000 were office, mess, and telephone orderlies; 14,000 were drivers; 10,000, postal workers; 9000, storewomen. Others served as butchers and bakers, ammunition examiners, hairdressers, welders, cine-projectionists, camouflage

modellers, chiropodists, and military policewomen. Others, specially trained, were on operational work as plotters, spotters, predictionists, and in other work as members of gun crews. The girls of the A.T.S. endured many of the perils of war side by side with the soldiers. They were subject to some at least of the military laws, in a way that the W.R.N.S., for instance, in relation to the Navy, were not subject. See E. Bigland, *Britain's Own Army: the story of the A.T.S.*, 1946; D. C. Wadge, *Women in Uniform*, 1947; L. Whately, *No Thoughts Survive*, 1949; V. Douie, *Daughters of Britain*, 1949.

number allowed for in the 1957-8 estimates was 3100.

Women's Services, see NURSING; QUEEN MARY'S ARMY AUXILIARY CORPS; RED CROSS; WOMEN'S LAND ARMY; WOMEN'S ROYAL AIR FORCE; WOMEN'S ROYAL ARMY CORPS; WOMEN'S ROYAL NAVAL SERVICE; WOMEN'S VOLUNTARY SERVICE; etc.

Women's Suffrage. Bills on W. S. passed second readings in the Commons 6 times between 1886 and 1911, but never proceeded beyond that stage. The organised violence of women in the 'suffragette' movement was abruptly



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A W.R.A.F. N.C.O. OPERATIONS ROOM CLERK ON DUTY IN AN AIRFIELD CONTROL TOWER

Women's Royal Naval Service. The W.R.N.S. came into existence in 1939, taking its name from an earlier organisation estab. between 1917 and 1919. Through the Second World War this Service performed valuable duties ashore, releasing men for service afloat. Such duties included administrative, domestic, secretarial, and cipher work. 'Wrens' were employed in the various communications depts, in meteorology, air radio, plotting, and many other spheres.

On 1 Feb. 1949 the W.R.N.S. became estab. as a permanent and integral part of the naval service, not subject to the Naval Discipline Act, but having a disciplinary code of its own. It continues to carry out similar duties, and serves both in the U.K. and abroad. The

terminated by war in 1914. Owing to the work of women during the war, opinion turned in their favour. In 1916 a conference recommended that some form of W. S. should be conferred. Early in 1918 a Bill granting limited franchise to women was passed, and 10 years later, 1928, the Bill which equalised the franchise passed the House of Lords.

In the U.S.A. the struggle for W. S. was long-drawn, but finally women over 21 were given the vote on the same terms with men. For many years there had been organisations to obtain W. S. The initial success came in 1869, when Wyoming, then a ter., gave women the suffrage. In 1893 the state of Colorado followed. Then followed Utah, Idaho, and Washington. In 1919 the national

Congress submitted a W. S. amendment to the constitution for action by the states. This became law in 1920.

W. S. has been granted at different times in different countries, e.g. Norway granted W. S. in 1912; Belgium in 1948.

Women's Voluntary Service for Civil Defence was formed in June 1938 at the request of the Home Secretary to stimulate the enrolment of women in Air Raid Precaution services. The scope of its work was later extended to all Civil Defence services and to work for evacuees, bombed people, the Services, etc. Since the war the work has included welfare schemes for old people, children, and hospitals. Its main responsibility is to Civil Defence, and the W.V.S. is prepared to help in emergencies anywhere at any time. Members give voluntary service throughout England, Scotland, and Wales to local authorities and local communities, as well as sending members overseas to do welfare work for the Forces.

'Wonder State,' see ARKANSAS.

Wonders of the World, Seven, see SEVEN.

Wonthaggi, state coal-mine tn in Victoria, Australia, 86 m. SSE. of Melbourne, on the coast. Many fine beaches are within a few miles radius, including Cape Patterson and Inverlock. W. adjoins the fertile Bass Valley dairying dist.

Wood (or à Wood), Anthony (1832-95), antiquary, b. Oxford, and studied at Merton College. Dugdale's *Antiquities of Warwickshire* inspired him to attempt the same task for Oxon., and after 6 years' labour he produced *History and Antiquities of the University of Oxford*. He worked further at *Athenae Oxonienses*, continuing Fell's idea. See L. Powys (ed.), *Life and Times of Anthony à Wood*, 1932.

Wood, Edward Frederick Lindley, see HALIFAX, first EARL.

Wood, Ellen, better known as **Mrs Henry Wood** (1814-87), novelist, b. Worcester, daughter of T. Price. In 1836 she married H. Wood, a banker. Her greatest success was *East Lynne*, 1861, a novel of middle-class life which sold over half a million copies and was dramatised repeatedly. Other highly popular books were *Mrs Halliburton's Troubles* and *The Channings*, both pub. in 1862. The *Johnny Ludlow Papers*, 1874-90, were contributed to the *Argosy*, a magazine of which she was proprietor and editor. See lives by C. W. Wood, 1894, and A. Sergeant, 1897.

Wood, Sir Henry (1869-1944), conductor, b. London. He received musical instruction from his mother, was assistant-organist at St Mary's, Aldermanbury, in 1879, and St Sepulchre's, 1882; and organist at St John's, Fulham, 1886. He had general musical training at the Royal Academy of Music and benefited from the experience as accompanist to the operatic class, and to the great teacher Manuel Garcia. He gave organ recitals at exhibitions in 1883-9. He first conducted the Rousby Opera Co. in 1889, and afterwards, for Marie Roze, the Carl Rosa

Opera Co., and other opera and concert organisations in London and the provs. W. was engaged by Robert Newman (1895) for Queen's Hall promenade concerts; thereafter he was continually identified with concerts there. He also conducted festivals. He visited America in 1904, 1925, and 1928. Between 1895 and 1919 he produced over 200 Eng. works, many for the first time, and in addition Eng. people owe to W. much of their knowledge of the modern Russian, Ger., and Fr. schools. W. undoubtedly did more than any of his contemporaries to foster a real appreciation of orchestral music, and of the leading musicians of his time. He enjoyed great popularity, and before he had approached his jubilee he had become a national figure. His *Memoirs, My Life of Music*, were pub. in 1938.

Wood, Sir (Henry) Evelyn (1838-1919), soldier, b. Cressing, Essex, and educ. at Marlborough. He first served in the Navy, which he entered in 1852, and was with the Naval Brigade in the Crimea. Transferring his services to the Army, he gained the V.C. during the Indian mutiny, and served through the Ashanti War with the rank of lieutenant-col. He commanded in the Boer War of 1881. In 1883 he raised the Egyptian Army, becoming its commander-in-chief; and he served in the Nile Expedition of 1894-5. In 1903 W. was made a F.M. G.C.M.G., 1882; G.C.B., 1897. See his autobiography, *From Midshipman to Field-Marshal*, 1906.

Wood, Sir (Howard) Kingsley (1881-1943), politician. He practised as a solicitor, and became Unionist M.P. for W. Woolwich in 1918, and in 1931 collaborated in the formation of the National Gov. As postmaster-general he was a great success, introducing many innovations; in 1933 he entered the Cabinet, was appointed minister of health (1935), and secretary of state for air (1938), being responsible for the empire air training scheme in Canada. He was chancellor of the Exchequer in 1940, and introduced the system of deferred credits to offset the effect of reductions in income-tax allowances, which had been made to restrict purchasing power and check inflation. He was responsible for the adoption of the 'pay-as-you-earn' income-tax scheme, but died before it was announced. He was knighted in 1918.

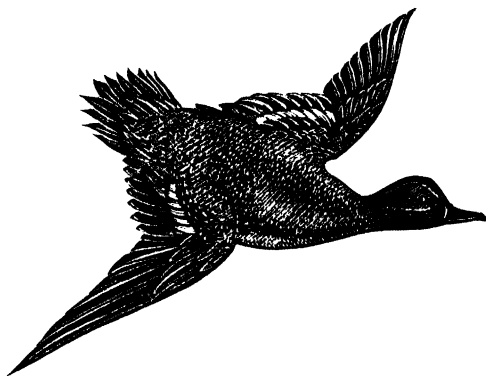
Wood, John, the Elder, commonly called 'Wood of Bath' (1704-54), architect, b. Bath, son of a builder; worked in London and Yorks for a time, and returned to Bath in 1727. He rebuilt and developed much of that city, including Queen Square, the Hospital, N. and S. Parades, and the Circus; also the neighbouring mansion of Prior Park, 1735-48. At Liverpool he designed the Exchange or Tn Hall, 1749-54. After his death, his son John Wood the Younger (1728-91) completed some of his buildings in Bath and also designed the Royal Crescent, 1767-75, and the New Assembly Rooms, 1769-71.

Wood is all that part of trees and shrubs that exists between the pith and the bark.

It consists of cells of sev. kinds, which in turn are composed of 2 substances, cellulose and lignin. The function of these cells is to lend strength to the W. stem, to conduct the sap from the roots to leaves, to conduct sugars in solution from the leaves to all parts of the plant, and to store food materials. W. also contains small quantities of 'extractives,' substances such as gums, resins, oils, and other materials which affect the durability, colour, taste, smell, or working properties of the W. Most trees form a distinct and darker-coloured heartwood in which these extractives are deposited. The outer part of the stem, the sapwood, is used for the conduction of sap up the tree. It is less durable but no less strong than the heartwood. See FORESTRY; TIMBER; TREE.

vent the process of end-grain engravings (as is sometimes thought), he was the first to see its possibilities. Instead of imitating the black lines of copper engravings, he used the white line which is the natural resultant of the process. During the 19th cent. W. sank to the level of a reproductive craft, although used with consummate skill by such men as the Dalziel brothers and Swain to facsimile the works of Leighton, Millais, Keene, Tenniel, and other artists of the time. Eventually photography and the introduction of process-engraving brought about its decline.

Early in the present cent. a number of artists saw in W. a medium of direct expression, and in 1920 they combined to form the Society of Wood Engravers. Since then the medium has flourished as



A WOOD ENGRAVING BY ROBERT GIBBINGS
From *Lovely is the Lee* (Dent)

Wood-carving, see CARVING.

Wood-engraving. Though closely allied to woodcuts (q.v.), W.s differ from them in that, instead of the designs being cut with a knife on the side grain of the wood, they are engraved with gravers on the end grain of a cross-section of the tree. Boxwood is the timber most in favour, having a grain that is close, even, and hard. The small, wedge-shaped gravers used for the work vary in section, to plough out different thicknesses of line. They are known by such names as tint tools, spitsticks, scaupers, etc. The term wood-cut has to-day come to be used rather loosely to denote either work with a knife or with a graver, but strictly speaking it should apply only to the former. The chief advantage of engraving over cutting is that it offers infinitely greater possibilities for fine lines and details. Whereas it would be technically possible to facsimile a cut by an engraving, it would be quite impossible to reproduce the detail of an engraving with the knife.

Although Thomas Bewick (q.v.) of Newcastle upon Tyne (1753-1828) did not in-

an art, and is considered by many to be *par excellence* the best for book illustration. The works of Eric Gill, Joan Hassall, Gwen Raverat, Robert Gibbings, and many others have been so used. Wood blocks are prepared 'type-high' so that when engraved they can be locked in a printing forme and printed at the same time as the type, thus producing a decorated book and not a book with plates. See D. P. Bliss, *A History of Wood Engraving*, 1928; R. J. Beedham, *Wood Engraving*, 1936, 1947; I. Macnab, *Wood Engraving*, 1948.

Wood Green, municipal bor. (created 1933) of Middx., England, situated between Hornsey and Southgate. There have been potteries here since the 17th cent. See also ALEXANDRA PARK.

Wood-lice, see TANTALUS.

Wood-lice, name given to isopod crustaceans of the family Oniscidae. Though they have all become adapted to terrestrial life, they find damp necessary to their existence, and some species, notably *Ligia oceanica*, which is over 1 in. long, are confined to the seashore. The food of W. is entirely vegetarian, and they are

mainly nocturnal in their habits. The oval body consists of a small head, 7-segmented thorax, each segment bearing a pair of legs, and abdomen, the appendages of which are the respiratory organs. *Oniscus aspidiotus* does damage in gardens.

Wood Naphtha, see PYROXYLIC.

Wood-pigeon, Ring-dove, or Cushat (*Columba palumbus*), member of the sub-family of the Columbinae, family of the Columbidae. It receives one of its names from the white patches forming a ring round its neck. It is distributed throughout the Palearctic region, and has recently multiplied greatly in Britain. Besides the white neck patches, it has also a white wing-bar. The eggs are white, the number being usually two.

Wood-screws, see SCREWS, BOLTS, AND NUTS.

Wood-spirit, see PYROXYLIC.

Wood Swallow, or Swallow Shrike, a genus of insectivorous birds (*Artamus*), indigenous to Australia, India, and Polynesia. They have a long, slightly curved, and sharply pointed bill, long wings, and short tail. General colour, black, blue, and rufous above, and white beneath. They are swift in flight and catch insects on the wing.

Wood Tin, variety of cassiterite (q.v.).

Woodard Schools. The Corporation of SS Mary and Nicolas was founded in 1848 by the late Canon Nathaniel Woodard to afford education according to the doctrines of the Church of England by means of colleges and schools. Its 4 divisional societies now conduct 17 schools, educating a total of 5000 pupils, in various places in England and Wales.

Woodbine, common name of *Lonicera periclymenum*, used by Shakespeare. See LONICERA.

Woodbridge, urb. dist. and mkt tn of Suffolk, England, at the head of the Deben estuary. W. possesses a number of historical buildings, including the Shire Hall, erected in 1570, windmills, a tide mill, and the par. church of St Mary, which was rebuilt in 1450. The tn was once a centre for rope-making, sail-cloth making, and ship-building, but present industries are those of boat-building, small factories, and horticulture. Near by is Sutton Hoo, where in 1939 was excavated the ship-burial of an Anglo-Saxon ruler; the treasures it contained are now in the Brit. Museum (see also SAXONS, Anglo-Saxon Art). Pop. 5700.

Woodbury Hill (900 ft), prehistoric earthwork in the N. of the Abberley Hills, Worcestershire, England. Owen Glendower camped here during his rebellion against Henry IV.

Woodchuck (*Marmota monax*), popular name of a species of Amer. marmot. It is a small burrowing rodent, 15-18 in. long; grizzled above and reddish below. It has a stout body, broad, flat head, and short, thick legs, and is easily tamed.

Woodcock (*Scolopax rusticola*), Brit. game bird, much valued for the table. The majority occurring in Britain are migrants, arriving chiefly in Oct. It belongs to the long-billed section of the Snipes, in which the culmen is longer than

the tarsus. They have a large eye, placed well back in the head, so that its hinder margin is just above the orifice of the ear. The wing is more rounded than in the Snipes. It has 12 tail-feathers, and the tibia is feathered to the tarsal joint. The adult male is about 14-15 in. long, and its general colour above is rufous, black, and grey, the whole aspect of the upper surface being mottled; the breast and sides of body are buff, the latter having light brown bars, edged with blackish lines. The Amer. W. is *Phytocheila minor*.

Woodcuts. The art of the woodcut consists of cutting from the surface of a plank of wood, with a short-bladed knife and gouges, the white portions of a design, leaving untouched those parts which are to print black. Proofs are taken by coating the untouched surface of the block with printer's ink and then, either in a printing-press or with a burnisher, pressing a sheet of paper against the inked surface. Unlike engraving or etching on copper, in which the ink is pressed into the lines and the surface of the plate wiped clean so that the lines alone print black, in W. it is the surface from which prints are taken, the lines showing white. Chestnut, pear, and other even-grained woods are most suitable.

Blocks of wood cut in this way were first used for printing on fabrics. The earliest extant examples on paper are believed to date from the 9th cent. in China and from AD 1418 in Europe (see BLOCK-BOOKS). The 16th-cent. W. of Dürer and Holbein (the latter's designs cut by Hans Lützelburger) show an almost miraculous craftsmanship. Cutting on the plank, however, is most suited to simple and broad contrasts of strong blacks and white; where detail and delicacy of tone are required, wood-engraving (q.v.) is the appropriate medium.

Woodcuts, hamlet of Dorset, England, in the par. of Handley, and part of old Cranborne Chase. Excavation disclosed a pre-Rom. site and a Romano-Brit. settlement. Iron and bronze utensils, Samian pottery, and Rom. coins were found.

Wooderson, Sydney C. (1914-), athlete, b. Camberwell, London. He gained his first big success in 1935, when he won the mile at the Amateur Athletic Association meeting; he won this event annually until 1939. An injured ankle stopped his attempt to win the 1500 metres title in the Olympic Games of 1936, but the next year he set up a new world mile record of 4 min. 6.4 sec., which stood until it was beaten by the 2 Swedish runners Haggg and Andersson in 1943 and 1944. W. ran his fastest mile (4 min. 4.2 sec.) when he was beaten by Andersson in Sweden. In 1937 he ran the half mile in 1 min. 49.2 sec.; after the Second World War he took up long-distance running, doing 3 m. in 13 min. 53.2 sec. in 1946. See also ATHLETICS.

Woodford, see WANSTEAD.

Woodhall Spa, urb. dist. of Lincs, England, 6 m. from Horncastle. It is noted for its mineral springs. Pop. 2100.

Woodhenge, see STONEHENGE.

Woodpeckers (Picidae), family of scan-sorial birds. The Picidae have natural attributes for climbing up the bark of trees, and for obtaining from the crevices thereof the insects which constitute their food. The feet, though very short, are unusually strong; the nails are broad and crooked, and the toes placed in pairs, that is, 2 forward and 2 backward. As an additional and powerful support in their ascent of the trunks of trees, their tail



Ronald Thompson

GREEN WOODPECKER AND YOUNG

feathers terminate in points, and are uncommonly hard, so that when they are pressed against the bark they assist the birds in their progress or in keeping their position. W. have an extensible tongue, of enormous length, which is furnished with muscles enabling the bird to dart it forth and to retract it again in a most remarkable manner. The Brit. species of W. are the spotted W. (*Dryobates major*), the Barred W. (*D. minor*), and the Green W. (*Picus viridis*).

Woodruff, see ASPERULA.

Woods, Margaret Louise (1856-1945), novelist and poetess, b. Rugby, daughter of G. G. Bradley, dean of Westminster. In 1879 she married H. G. Woods, who was later President of Trinity College, Oxford. Her realistic novel *A Village Tragedy*, 1887, showed rare maturity, while her *Lyrics and Ballads*, 1889, revealed her poetical gifts. Other novels are *The Vagabonds*, 1894, *Sons of the Sword*, 1901, *The Invaders*, 1907, and *The Spanish Lady*, 1927. *Wild Justice*, 1896, and *The Princess of Hanover*, 1902, are poetic dramas, and her *Collected Poems and Plays* appeared in 1913.

Woods, Lake of the, large irregular lake in the SW. of Ontario, Canada, touching Manitoba on the W. and Minnesota, U.S.A., on the S. Its length is 70 m., breadth 10-50 m., and area 1500 sq. m. It is fed by the Rainy R. and discharges

through the Winnipeg R. into Lake Winnipeg.

Woodstock: 1. Mun. bor. and mrkt tn of Oxon., England, on the Glyme. W. was the residence of some of the Eng. kings, and was the scene of the romantic legend of Henry II and Fair Rosamund. After Blenheim (1704), the place was granted to the Duke of Marlborough, Blenheim Palace (q.v.) being erected near by. Glove-making is carried on. Pop. 1800.

2. Co. tn of Oxford, Ontario, Canada, 80 m. SW. of Toronto, 25 m. E. of London, and 32 m. from Lake Erie. It is the co. tn of a rich agric. dist., and has abundant cheap hydro-electric power. Industries include machine-shops, furniture, stock foods, farm tools, organs and pianos, planing mill, stoves, metal signs, concrete machinery, hardware, and truck or lorry trailers. Pop. 16,890.

Woodville, or Wydville, Elizabeth, see ELIZABETH (c. 1437-92), queen of England.

Woodward, Sir Arthur Smith (1864-1944), geologist, b. Macclesfield. He was educ. at Owens College, Manchester, and held the post of Keeper of the Geological Dept. Brit. Museum, 1901-24. He pub. important researches on fossil fishes, amphibia, birds, mammals, and reptilia, including a text-book, *Vertebrate Palaeontology*, 1898.

Woodward, Sir (Ernest) Llewellyn (1890-) historian, educ. at Merchant Taylors' School and Corpus Christi College, Oxford. He was prof. of international relations at Oxford 1944-7; prof. of modern hist. there 1947-51, and has since held a chair at Princeton Univ., U.S.A. With R. D'O. Butler he ed. *Documents on British Foreign Policy*, 1919-39, 1944-55. His other pubs. include *The Age of Reform* (Oxford History of England series), 1938. He was knighted in 1952.

Woodwork, see CARPENTRY; CARVING; FRETWORK; FURNITURE; INLAYING; JOINERY; MARQUETRY; POKER-DRAWINGS.

Woodworm, see TEREDO.

Wookey, vil. of Somerset, England, in the Mendip Hills, close to Wells. Pop. 950.

Wookey Hole, vil. of Somerset, England, 2 m. from Wells, with a paper mill. It is noted for the caves, also called Wookey Hole, source of the R. Axe; objects dating from the palaeolithic to Romano-Brit. periods have been found. Pop. 800.

Wool, soft, curly form of hair worn by some animals, useful to them in preventing loss of body heat, and adapted by man to the manuf. of textiles for clothing. From the biological point of view, a distinction can be drawn between W. and hair: W. fibres are solid, i.e. have no internal spaces, whereas hair fibres have a hollow core running up the centre of the fibre. The coats of the merino and Eng. breeds of sheep are known *par excellence* as W., while the term is also applied to the fibres obtained from llama, the alpaca, the Angora goat, and, perhaps more debatably, to cashmere, camel, and

Angora rabbit hair. The W. of the Angora goat, however, is more generally known as mohair. Microscopically, W. is distinguished more by the possession of a scaly surface to the fibre. The scales over the fibre surface overlap one another like tiles on a roof, thus producing the saw-like outline perceptible only under the microscope. The serrations are more numerous in the finest W.s and it is to the existence of these minute irregularities that W. owes its property of matting or felting into a compact mass. This gives W. its unique value in the production of tweed-type fabrics and felts.

Chemically W. consists of a substance called keratin which belongs to the class of chemical substances called proteins and contains carbon, hydrogen, nitrogen, oxygen, and sulphur. It burns slowly, giving off an odour like burning feathers, and leaves a small, bead-like residue. This latter property serves to distinguish it from vegetable fibres, which burn rapidly and leave only a little fine white ash. The properties desired in W. for manufacturing purposes are fineness of fibre, length of staple (a lock of fibres), strength and uniformity of fibre, elasticity, lustre, and freedom from woody seeds (burs), and other vegetable matter. The weaving of woollen fibres appears to have been practised at a very early date. Herodotus mentions that the Babylonians were clothed in woollen tunics, and the Hellenic peoples were well versed in the art of weaving. The Romans understood all the essentials of the W. manufacturer's craft, and they carried their knowledge into the countries conquered and settled by them. Through the Middle Ages the chief centres of the woollen manuf. were on the Continent, notably in Flanders. Efforts were made at various times to estab. the industry securely in Britain (see BRADFORD). Flemish weavers were introduced into Carlisle under royal protection in the reign of William I, and a colony was afterwards founded in Pembrokehire. Notwithstanding this encouragement, a great proportion of the W. grown in England was exported to Flanders, and Edward III prohibited this export with a view to stimulating house industries. The prohibition was removed by Queen Elizabeth, but again from 1660 to 1825 the export of W. was forbidden. The constant encouragement given to woollen manufacturers led to large areas being turned into pasture land for the provision of the raw material. The development of machinery had the effect of concentrating the greater part of the industry on the N. coalfields, and the S. centres gradually dwindled or persisted as seats for the manuf. of certain specialised products. In later years the supply of the raw material from Britain and Europe has been small (the U.K. wool production in 1955 was about 2.2 per cent of world output), the chief importations being from Australia, New Zealand, and S. Africa. In America W. manuf. was not estab. on factory lines until the end of the 18th cent. The breed of sheep recognised as providing the best W. for fine-quality

clothing purposes is the merino. Originally a Sp. sheep, it has made its way into all quarters of the world. It was introduced into Australia at the end of the 18th cent., and the colonists set about growing W. to supply the European mkt. (See also SHEEP.)

The terms woollen and worsted are used to describe the 2 kinds of yarn which can be spun from W., and the cloths woven from these yarns. In the woollen trade not only are short fibres employed, but all kinds of re-manufactured materials and by-products are used. These comprise noll, the short fibres rejected in the combing operation for worsted-yarn production; mungo, the shreds of previously manufactured clothing; shoddy, the shreds of softer materials, as blankets, shawls, etc.; and flocks, collections of fibre from the machines used in the various processes. Sheep's W. is sometimes washed before shearing; the process rids the fleece of extraneous dirt, but it also removes much of the natural grease. In shearing, the fleece should be clipped off in one continuous piece, the W. being rolled up and secured by a simple knot tied in a wool band put round the fleece. The fleeces are then classified according to general quality, usually on the farm or sheep station. After selling to the W. merchant or manufacturer W. is sorted by the sorter or stapler, who divides each fleece into separate qualities, as the W. varies in quality from the shoulders to the tail of the animal. The operation of sorting requires discrimination and long training. In Britain a wool sorter is apprenticed for 7 years before being considered proficient. The W. (except in yarn production) is then 'scoured' by the use of a detergent (soap or synthetic) and a mild alkali and afterwards dried by steam heat. The next operation is to disentangle the matted fibres of the fleece. To effect this the W. is fed into a 'wiley' consisting of a large drum and small cylinders armed with spikes, in such a manner that the entangled fibres are pulled apart as they pass between the cylinders. W. is then usually 'blended', i.e. W.s of different kinds and W. substitutes, in proportions suitable for the purpose in view, are spread in layers forming a stack, each layer being oiled as it is put down. 'Scribbling' or 'carding' is an operation by which the mass of fibres is more perfectly mixed and rendered suitable for spinning. The carder consists of a number of cylinders with an enormous number of teeth which work the W. into a web or continuous film of fibres. In the final section of the carder this film is divided into narrow strips and then subjected to a reciprocating rubbing action so as to give a circular section. The slubbing is now a long rod of pith-like W. with no twist, and therefore capable of being stretched to a considerable extent. The attenuation and twisting required to convert slubbing into yarn (q.v.) of the requisite count are performed by means of the 'spinning-mule,' a machine of somewhat complicated construction, though the operation is simple. For

the preparation of worsted yarns some 16 processes are required. Among these is an operation known as 'combing.' This is performed by a machine which separates from the mass all the fibres above a certain length and imparts a high degree of parallelism to them. After spinning, therefore, worsted yarn presents a clearer-out appearance than woollen yarn, which remains fluffy. The principles of weaving are similar to those employed in other textiles. Dyeing may be performed at almost any stage of the process, given the necessary cleansing preliminaries. Some finishing operations vary according to the nature of the fabric. Some woollen cloths are known as tweeds, meltons, doeskins, buckskins, etc., and are characterised by softness and fullness. Worsted form the largest class of suit and dress materials, but to an increasing extent synthetic fibres which claim similar structure and properties (see MAN-MADE FIBRES) are being used either singly or in blends with W. for many fabrics and garments which used to be made entirely of W. In 1918 the Brit. W. industry set up its own research organisation, which is known as the Wool Industries Research Association and has its H.Q. at Torridon, Headingley, Leeds, 6.

See *American Wool Hand Book*; F. Lipson, *History of the English Woollen and Worsted Industries*, 1921; J. W. Radcliffe, *Woollen and Worsted Yarn Manufacture*, 1950; C. L. Bird, *Theory and Practice of Wool Dyeing*; *British Wool Manual*, 1952; E. Lipson, *Short History of the Wool Trade*, 1953.

Woolcombe, vil., par., and seaside resort of N. Devon, England, 7 m. from Ilfracombe, with 3 m. of sands and the famous Barricade beach of tropical shells. The vil. and par. of Morteohoe forms with W. a single civil par. The Early English church at Morteohoe has interesting carving and the tomb of Wm de Tracy (1321), related to one of the murderers of Becket. The Morte Point, Baggy Point, and Potter's Hill area is a National Trust property. Near Morteohoe is the Bull Point lighthouse; a red light is reflected on to the Morte Stone, where there are dangerous currents. Pop. of W. and Morteohoe 1500.

Woold, see WELD.

Wooler, tn and par. of N. Northumberland, England, 14 m. NNW. of Alnwick. Fragments of the medieval castle remain, and there are a number of prehistoric settlements in the district. It was once a stronghold, guarding one of the principal passes on the Border. W. lies at the foot of the Cheviot Hills; it is now an agr. mkt and a resort. Pop. 1750 (1954).

Woolf, Virginia (1882-1941), novelist, b. London. She was educ. at home, and married in 1912 Leonard Sidney Woolf and at Hogarth House she and her husband set up the Hogarth Press. Her first novel, *The Voyage Out*, appeared in 1915, but it had in fact been written some years previously, as is evident from its immaturity. In 1919 she pub. *Night and Day*, but did not achieve a really charac-

teristic work until the production of *Jacob's Room*, 1922, which reveals her qualities of subtle apprehension and delicate balance of taste. Her early works had been realistic studies; but in this she followed Joyce in adopting the 'stream of consciousness' method. Later books which won an international reputation were *Mrs Dalloway*, 1925, *To the Lighthouse*, 1927, *Orlando*, 1929, *The Waves*, 1931, and *The Common Reader*, 1925, the last being a collection of articles for *The Times Literary Supplement*. *Orlando* is perhaps her most outstanding novel; a biography of Roger Fry was pub. in 1940; in 1941 appeared *Between the Acts*, a novel pub. posthumously, and, in 1942, *The Death of the Moth*, which contains a selection from a mass of miscellaneous work left by her at her death. The beauty and sensitivity of her prose, especially in *The Waves*, is unequalled among modern Eng. novelists. See lives by E. M. Forster, 1942; D. Daiches, 1945; J. Bennett, 1945; R. L. Chambers, 1948; B. Blackstone, 1948; also Lord David Cecil, *Poets and Story-Tellers*, 1949.

Woollahra, metropolitan municipality of Sydney, in Cumberland co., New S. Wales, Australia. One of the E. suburbs, it fringes the S. side of Sydney Harbour. Pop. 48,220.

Woolcott, Alexander Humphreys (1887-1943), Amer. journalist, b. Phalanx, New Jersey. Educ. at Hamilton College and Columbia, he was dramatic critic of the *New York Times* from 1914 to 1922, and from 1925 to 1928 was on the staff of the *World*. Famous both as a journalist and as a personality, he wrote *Mrs Fiske*, 1917, *Shouts and Murmurs*, 1923, *Mr Dickens Goes to the Play*, 1923, *Enchanted Aisles*, 1924, *The Story of Irving Berlin*, 1925, *Going to Pieces*, 1928, *While Rome Burns*, 1934, and *Long, Long Ago*, 1943. His *Letters* were ed. by B. Kaufman and J. Hennessy in 1944.

Woolens, see WOOL.

Woolley, Sir Charles Leonard (1880-), archaeologist and author, b. London; educ. at New College, Oxford. Later he became assistant keeper in the Ashmolean Museum, Oxford. He went with the Eckley B. Cox expedition to Nubia, 1907-11; he was in charge of the Brit. Museum excavations at Carchemish until 1914. From 1922-34 he conducted excavations at Ur (q.v.) for the Brit. Museum and the Museum of the Univ. of Pennsylvania. In 1935-9 and 1946-9 he excavated in the Hatay near Antioch (see ALALAKH). During the First World War he did intelligence staff work in Egypt, and was a prisoner in Turkey for 2 years. He was in the Intelligence Dept. of the War Office from 1939, and from 1943 was archaeological adviser to the War Office, responsible for the protection of monuments of artistic and historical interest in the war areas. In addition to many detailed archaeological writings, he has written successful books for the general reader, among which are *Ur: The First Phases*, 1947, *Digging up the Past*, 1950, *Ur of the Chaldees*, 1950, *A Forgotten*

Kingdom, 1953, *Spadework* (autobiographical), 1953, and *Excavations at Ur*, 1954.

Woolley, Frank Edward (1887-), cricketer, b. Tonbridge. A left-handed batsman and bowler, he played for Kent, 1906-38, and represented England 64 times. In 1908 v. Middx he took 6 wickets for 8 runs; in 1911 he took 7 for 9 v. Surrey. Against Worcester in 1909 he and A. Fielder shared a record 10th-wicket stand of 235. His aggregate of 58,969 runs (145 centuries) is second only to Jack Hobbs. He took 2068 wickets, and his 913 catches are a career record. Toured Australia, New Zealand, and S. Africa. Made hon. cricket member of M.C.C., 1949.

Woolley, Richard van der Riet (1906-), b. Weymouth, Dorset, Astronomer Royal since 1956. He was educ. at the univs. of Cape Town and Cambridge. Director of the Commonwealth Observatory, Mt Stromlo, 1939-56; prof. of astronomy, Australian National University, 1950-6; F.R.S., 1953. He has pub. (with Sir Frank Lyson) *Eclipses of the Sun and Moon*, 1937, and (with D. W. N. Stibbs) *The Outer Layers of a Star*, 1953.

Woolman, John (1720-72), Amer. Quaker, b. Northampton, New Jersey, tailor, preacher, reformer, and essayist. From 1746 he spoke and wrote against slavery and oppression of the poor, persuading many to liberate their slaves. His pioneer work underlies the anti-slavery movement, which triumphed in the next cent. He came to England (1772), visiting Quaker meetings on foot from London to Westmorland: he d. in York of smallpox. His jour. and essays, notable for their simplicity of language, breathe a spirit of justice and charity. See his *Journal*, first pub. 1774 (ed. with Whittier's introduction 1871, and many reprints, some with essays), and *Journal and Essays* (definitive ed. by A. M. Gummere), 1922; also Janet Whitney, *John Woolman. Quaker*, 1943; Reginald Reynolds, *The Wisdom of John Woolman*, 1948.

Woolner, Thomas (1825-1892), sculptor and poet, b. Hadleigh, Suffolk. He studied under Wm Behnes and at the Royal Academy. He was an original member of the Pre-Raphaelite Brotherhood, and wrote poems for *The Germ*. His statues and portrait busts of famous contemporaries are well known, and his statue of John Stuart Mill stands on the Thames Embankment in London.

Woolsack, seat of the Lord High Chancellor (see CHANCELLOR) in the House of Lords, being a large square bag of wool, without back or arms, covered with red cloth.

Woolsey, Sarah Chauncy, see COOLIDGE, SUSAN.

Woolsorter's Disease, see ANTHRAX.

Woolton, suburb of Liverpool (q.v.).

Woolton of Liverpool, Frederick James Marquis, first Earl of (1883-), business man and politician, b. Manchester and educ. at Manchester Grammar School and Univ., where he was for a time a research

fellow in economics. He entered business, and became chairman and senior managing director of Lewis's Ltd., Lewis's Investment Trust Ltd., and its subsidiary companies. He was elected chancellor of Manchester Univ. in 1944. He served on sev. gov. committees and became director-general of equipment and stores in the Ministry of Supply from 1939 to 1940; and was minister of food from 1940 to 1943, minister of reconstruction from 1943 to 1945, and lord president of the council in the Churchill 'caretaker' gov. in 1945. After the general election in 1955, being succeeded by Oliver Poole. From 1951 to 1952 he was lord president of the council; and chancellor of the Duchy of Lancaster 1952-5. W. was raised to the peerage, 1939; made a viscount, 1953, and an earl, 1955.

Woolwich, parl. and metropolitan bor. of London, the easternmost portion of the co. It is the only bor. on both sides of the Thames, the greater part lying S. of the river and 2 small parts on the N. or Essex shore. They are connected by a foot tunnel and the W. Free Ferry. The bor. comprises the anct pars. of W., Plumstead and Iltham (qq.v.). The name W. implies an early connection with the production or export of wool. In the Middle Ages it was a fishing vil. An important shipbuilding yard was estab. late in the 15th cent. (closed in 1869), and the famous Royal Arsenal (developed from the Royal Laboratory, Carriage Dept. and a Powder House, probably estab. about the same time as the dockyard), caused the growth of W. into a tn. The main gov. foundry was moved from Moorfields to W., 1716-17. The Royal Military Academy estab. inside the Arsenal in 1741 was the first military school in the kingdom. It was amalgamated with the Royal Military College at Sandhurst in 1946. The Crimean War resulted in many more factories and an increase in pop., greatly changing the character of the tn. In the Rotunda, a building designed by John Nash, is a military museum. W. returns 2 members to Parliament. Area 8282 ac. (including 902 ac. of public open spaces); pop. 149,700.

Woolworth Family, Amer. merchants and businessmen. Frank Winfield W. (1852-1919), b. Rodman, New York, studied at a nearby business college, and in 1879 opened a '5-cent' store in Utica, New York, that soon failed. In the same year he started again in Lancaster, Pennsylvania, adding 10-cent goods and taking in as partners his brother Charles Sumner W. (1857-1947) and other men. The partnership opened many more 5- and 10-cent stores in other cities, and was incorporated in 1911 as the F. W. Woolworth Company. When F. W. Woolworth died it had more than 1000 stores in the U.S.A. and Canada. He left a fortune estimated at \$65m., which in time descended to his grand-daughter,

Barbara Hutton. His brother C. S. W. succeeded him as chairman of the company.

The basic idea of the W. business was to sell nothing at a price greater than 5 or 10 cents (3d. or 6d. in England); to keep no books, and hence to sell for cash only; to make no deliveries, and hence further to cut the overhead cost; and finally, as more shops were opened, to buy goods from factories in large quantities for low prices and to obtain a large discount through cash payment. The limitation of store prices to 5 and 10 cents was abandoned during the Second World War because of economic conditions. Before that the concern had spread to Germany; and at the end of 1956 there were 1899 stores in the U.S.A., 10 in Cuba, 172 in Canada, 955 in Great Britain, and 68 in Germany. The H.Q. of the business has long been the W. Building in New York, which for many years was the tallest structure in that city.

Woomera Rocket Range, in the desert country of Central Australia, c. 300 m. NW. of Adelaide, the centre of a number of rocket-testing ranges which extend in a NW. direction to the W. Australian coast 1200 m. away and can be extended for a further 1500 m. across the Indian Ocean. W. has been developed since 1946 by the Weapons and Research Estab. in the Australian Dept. of Supply, with H.Q. at Salisbury, c. 15 m. from Adelaide. The first range at W. was operated in 1949. Guided missiles developed in the U.K. are tested at the W. range; laboratories at Salisbury carry out the development of electronic and optical instruments for use at the range during trials, preparation of test vehicles for measuring missile characteristics, and analysis of trial results. Flying programmes demanded by the trials, involving both conventional aircraft and 'Jindivik,' the high-speed pilotless aircraft used as a target for anti-aircraft weapons, are operated from Edinburgh airfield, near Salisbury. The name W. is derived from a primitive but effective implement developed by Australian aborigines to achieve power and accuracy when throwing spears.

Woonsocket, city of Providence co., Rhode Is. (N.), U.S.A., on Blackstone R., about 13 m. from Providence. It is a woollen centre, and also produces cotton and rayon goods, rubber, paper, and metal products, glass fabrics, bedding, textile machinery, insulators, leather goods, machine tools, and beverages. It is the seat of Hill College. W. was settled before 1675, and its inhab. are predominantly of French-Canadian descent. Pop. 60,210.

Woorall, name for curare (q.v.).

Wooster, city, co. seat of Wayne co., Ohio, U.S.A., on Killbuck Creek, 30 m. SW. of Akron, in farming area with oil and gas wells. It manufs. rubber and metal products, mill machinery, paint and varnish, etc. The College of W. and Ohio and the Agric. Experiment Station are here. Pop. 14,000.

Worcester, Florence of, see FLORENCE OF WORCESTER.

Worcester. 1. City, mkt tn, co. and parl. bor., and co. tn of Worcestershire, England, 22 m. SW. of Birmingham. It is situated upon both banks of the Severn, though principally on the l. b. W. was important as early as the 7th cent. owing to its situation on a ford in the Severn. The city motto, 'Faithful in war and peace,' commemorates the royalist support given by W. during the Civil wars. In 1651 Charles II lodged in the city, and from the cathedral tower watched his forces routed by Cromwell's troops. Many royalist soldiers were imprisoned in the cathedral after the battle. W. has been an episcopal see since 680, but its early hist. is obscure. In 964 St Oswald founded a new church there for Benedictine monks, and Bishop Wulfstan began rebuilding on a large scale in 1084. King John is buried between the shrines of Oswald and Wulfstan.

The cathedral of Christ and St Mary the Virgin includes a Norman crypt, an impressive Geometrical W. window, and a Perpendicular cloister with a well-preserved lavatorium and some carved bosses on the lierne vaulted roof. The circular Norman chapter house and the original refectory, now used by the King's School, remain. The external length of the cathedral is 415 ft, and the central tower (completed 1364) is 196 ft high. The exterior was extensively restored between 1857 and 1874. The building of the Early Eng. choir and Lady chapel began in 1224, and was effected by Bishops De Blois and Cantelupe, whose effigies are in the chapel. The last important addition to the cathedral was Prince Arthur's chantry, with a magnificent Perpendicular screen, erected by Henry VII in memory of his eldest son.

Another interesting building is the Commandery, formerly called the Hospital of St Wulfstan (1085-1541). It was founded by Wulfstan for a master, priests, and brethren, under the Rule of St Augustine. At the battle of W., in 1651, the Commandery was the H.Q. of the Royal forces under the Duke of Hamilton, and the Royal Standard was raised on the hill known as Fort Royal, which at that time was part of the grounds. St Helen's is the oldest church in W., dating back to 680, but rebuilt in the 13th and 15th cents. St Andrew's and St Alban's are other medieval eccles. structures, but these 3 churches are not now used as places of worship. Medieval buildings still remain in New Street and Friar Street, the most important being that built about 1480 by the Grey Friars. In 'King Charles's House' Charles II is said to have hidden after his defeat at W. From 'Queen Elizabeth's House,' in The Trinity, Queen Elizabeth, according to tradition, addressed the people when she visited W. in 1574. W. is rich in Georgian buildings. The Guildhall (1721-3) is the work of Thomas White, a native of W. The Royal Grammar School dates back to the 13th cent., when it was supported by merchants of the Trinity Guild. Elizabeth granted it a charter in 1561. The W. Cathedral King's School was estab.

and endowed out of the monastic funds by Henry VIII in 1541 and reorganised in 1884. More modern buildings include the Shire Hall, the W. Royal Infirmary, and the Victoria Institute.

From medieval times W. was the centre of a prosperous glove trade. The firms of Dent's and Fownes', founded in the 18th cent., carry on this tradition. The Royal W. Porcelain Works were founded in 1751 by 'John Wall doctor of Physic and William Davis Apothecary.' Wall was also connected with W. Royal Infirmary, which opened in a house in Silver Street in 1745. Engineering is the leading modern industry in W., and includes mining and electrical engineering. There are also iron and brass foundries, pattern shops, and machine and fitting shops. Other industries include the manuf. of W. sauce, printing, footwear, furniture, and agric. machinery. *Berrow's Worcester Journal* (q.v.) traces its hist. to 1690. Pop. 63,200.

See V. Green, *History and Antiquities of the city and suburbs of Worcester*, 1796; W. Moore Ede, *The Cathedral Church of Worcester*, 1925; J. Glaisyer and others, *County Town*, 1946; V. Noakes, *The Cathedral Church of Worcester*, 1951; B. Little, *The Three Choirs Cities*, 1952.

2. City, co. seat of Worcester co., Massachusetts, U.S.A., 39 m. from Boston, and the second largest city in the state. The Blackstone, Chicopee, and other rivs. afford a plentiful water supply. There are fine public buildings and parks, loom and envelope manufs., foundries, wire works, wool and silk mills, and manufs. of leather goods, shoes, and carpets. W. is the seat of Clark Univ., Holy Cross College, W. Polytechnic Inst., and a state teachers' college. It was known as Quinsigamond till 1684. Pop. 203,486.

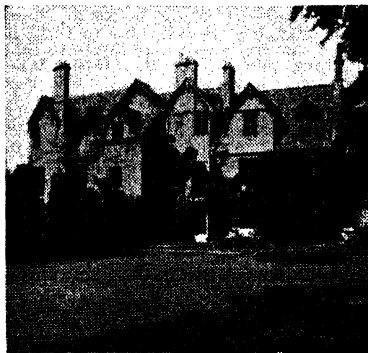
3. Tn and dist. of Cape Prov., S. Africa, 109 m. from Cape Town by rail; the centre of a rich fruit-growing dist. Local industries include dried and crystallised fruits, jam factory, fruit and vegetable cannery. There are also engineering works, a foundry, and brickfields. Pop.: (whites) 9194; (others) 16,181.

Worcester (1751–present day), porcelain factory, in 1752 absorbed Lund's Bristol (q.v.) factory and became the most productive in England, especially for tableware. The best period, 1752–83, is known as the 'Dr. Wall Period' from the name of one of the founders. See PORCELAIN, *Soft-paste*; CHINAWARE. See R. L. Hobson, *Worcester Porcelain*, 1910; A. R. Marshall, *Worcester Porcelain*, 1955.

Worcester College, Oxford, founded in 1283 as a school for Benedictine monks under the name of Gloucester College, received its charter of incorporation in 1714. Many of the monastic buildings remain, and are used as undergraduates' rooms. The head of the college is the Provost. Past members of the college include Thomas Walsingham, Thomas Coryate, Sir Kenelm Digby, Richard Lovelace, De Quincey, and Henry Kingsley.

'**Worcester Journal**,' see 'BERROW'S WORCESTER JOURNAL.'

Worcestershire, midland co. of England, bounded N. by Staffordshire, S. by Gloucestershire, E., by Warwickshire, and W. by Herefordshire and Shropshire. The surface varies, the S. and SW. being hilly, while through the centre run the riv. valleys, with the Lickey and Clent hills in the N. The prin. range is that of the Malvern Hills in the SW., which reaches a height of 1395 ft in Worcester Beacon. The N. Cotswold Hills and Breton Hill lie along the SE. border of the shire. The Severn is the chief riv., with its tribs. the Teme, Stour, and Avon, forming the vales of Worcester (Severn), Teme, and Evesham (Avon), the most fertile part of the co. W. is well wooded and contains the 2 anct forests of Wyre and Malvern Chase. The greater part of the co. was at one time in the hands of the Church, and there were no less than 13 great monastic foundations. Of these there are the ruins at Pershore and Evesham, both dating from the 8th cent., Worcester Cathedral, and the priory church at Malvern also of the same date; and ruins at Halesowen, Bordesley, and Astley dating from the 13th cent. The co. is rich in domestic architecture of the Tudor and Georgian periods, and possesses a number of notable country houses. Famous figures in literature and music associated with W. include the chronicler Florence of Worcester, Wm Langland (author of the *Vision of Piers Plowman*), Samuel Butler (author of *Hudibras*), Richard Baxter, Sir Edward Elgar, and Francis Brett Young.



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WORCESTER COLLEGE

The medieval buildings were part of the original monastic foundation.

W. is famous for its orchards and mkt gardens, and hops are also grown. Almost the whole co. is under cultivation, rather more than half being devoted to permanent pasture; wheat and oats are the main crops. Coal is mined, and ironstone, limestone, and salt are also found. Droitwich and Stoke Prior are noted for their brine springs, and Malvern is a holiday

and health resort. Worcester (q.v.) is famous for the manuf. of porcelain and engineering, and Kidderminster for carpets; while in the N. are a group of tns, Dudley, Netherton, etc., included in the Black Country, where iron-work, etc., is carried on. Other manufs. are needles and fishing tackle at Redditch, glass at Stourbridge, and gloves at Worcester. Canals connect the Severn with the Midland canal system. Worcester is the co. tn, other tns being Bewdley, Droitwich, Dudley, Evesham, Kidderminster, Pershore, Tenbury Wells, and Upton-on-Severn, Stourport, Stourbridge, Bromsgrove, Oldbury, and Halesowen on the Birmingham fringe. The co. contains 3 co. and 3 bor. constituencies. Area 700 sq. m.; pop. (1956) 545,600. See Thomas Habington (1560-1647), *Survey of Worcestershire*; Thomas Nash (1588-1648), *Collection for the History of Worcestershire*; Victoria County History, *Worcester*; A. Mawer and F. M. Stenton, *Place Names of Worcestershire*, 1927; A. Mee, *Worcestershire*, 1948; L. T. C. Rolt, *Worcestershire*, 1949.

Worcestershire Regiment, The, Brit. regiment, formerly 29th and 36th Foot. The 29th was raised in 1694, and served under Marlborough and took part in the Amer. War, 1776-7. A detachment served in Lord Howe's fleet on 'the Glorious First of June,' 1794: it was granted the Naval Crown as a badge. The 29th served under Wellington in the Peninsula with great distinction, and took part in sev. Indian campaigns. The 36th was raised in 1701 and was organised for 'sea-service.' It served in Spain, Nova Scotia, Flanders, before going to India in 1783. The regiments were linked in 1881 and took part in the S. African War, 1899-1902. During the First World War they raised 22 battalions, and served in France, Flanders, Italy, Macedonia, Gallipoli, Egypt, Mesopotamia, and Persia. The second battalion of the regiment gained great distinction for saving the Channel ports from capture by Germans at Gheluvelt, 31 Oct. 1914. In the Second World War the regiment fought in France, Freetown, N. Africa, Burma, Italy, and NW. Europe, and in the Far E. As a unit of the Second Army it took a prominent part in the Rhine operations of Mar. 1945.

Worde, Wynkyn (or Winkyn) de, or Jan van Wynkyn (d. c. 1535), printer, who came to England from Alsace-Lorraine, and helped Caxton from 1476, succeeding him at his printing office (1491). He became naturalised in 1496, and lived in Fleet Street, London, from 1500, removing to St Paul's Churchyard in 1509. He made improvements in the art of printing, especially in type-cutting, his works (over 800 in number) being at times distinguished by elegance and neatness, but often spoiled by carelessness. See F. G. Duff, *Printers, Stationers, and Bookbinders of Westminster and London, 1476-1535*, 1906; H. R. Plomer, *Wynkyn de Worde and his Contemporaries*, 1925.

Wordie, James Mann (1889-), scientist and explorer, geologist and chief of

scientific staff of Shackleton's British Antarctic Expedition, 1914-17 in the *Endurance*. Led expeditions to Spitsbergen, Greenland, Jan Mayen, and Baffin Is. between the wars. Awarded Founder's medal of Royal Geographical Society, 1933. Master of St John's College, Cambridge, 1952. Chairman of Brit. committee for International Geophysical Year, 1957-8.

Wordsworth, Christopher (1807-85), churchman and writer, nephew of the poet, b. London, and educ. at Winchester and Trinity College, Cambridge. He was headmaster of Harrow (1836-44), canon of Westminster (1844), held a living in Berkshire (1850-60), and became Bishop of Lincoln (1868). He was a noted hymn-writer and wrote *Gracious Spirit, Holy Ghost*. His pubs. include: the Bible commentary, *Greek New Testament*, 1856-60, *Old Testament*, 1864-70, *Memoirs of William Wordsworth*, 1851. In 1873-5 occurred his controversy with the Wesleyans, and 'the Great Coates Case.' See life by J. H. Overton and E. Wordsworth, 1888.

Wordsworth, Dorothy (1771-1855), diarist, only sister of the poet, b. Cockermouth, Cumberland. From 1795 she kept house for her brother, accompanying him and Coleridge to Germany (1798-9). She later settled with Wordsworth and his wife at Grasmere, whence they moved to Rydal Mount (1813). The poet acknowledged how much he owed to her inspiring companionship, and dedicated to her the *Evening Walk*, 1793. Her own writings display great powers of description and a keen appreciation of natural beauty. See lives by E. Lee, 1886 and E. de Selincourt, 1933. See also C. M. McLean, *Dorothy and William Wordsworth*, 1927.

Wordsworth, William (1770-1850), Poet Laureate, b. Cockermouth, Cumberland, son of a land attorney. Left an orphan at 13, with the help of uncles he was educ. at Hawkshead School and St John's College, Cambridge. His last summer vacation was spent in a walking tour in France, and after he had taken his degree in 1791 he paid a second visit to that country and was converted to republicanism. He also fell in love with Annette Villon, daughter of a Blois surgeon, and had by her a child, Caroline, whom he acknowledged at her christening. W. wished to marry Annette, but their differing creeds, poverty, and the war were grave obstacles, and he returned home, leaving her and escaping the fate of the Girondist party, with whom he had been about to throw in his lot. His guardians wished him to take orders, but he was averse to any profession. Meanwhile the later excesses of the Fr. republicans had turned his early admiration to horror, and for a time he embraced the rationalist philosophy of Godwin (q.v.). In 1793 appeared his first pub. works, *The Evening Walk* and *Descriptive Sketches of a Pedestrian Tour in the Alps*.

His meeting with Coleridge in 1795 confirmed him in his resolution to devote himself to poetry, and at the same time

by a fortunate chance he was rendered independent by a legacy of £900 left him by his friend Raisley Calvert. With his sister Dorothy, who was to be his life-long companion, he settled first at Race-down, Dorset, and then at Alfoxden in Somerset near Nether Stowey, where Coleridge was living. During this intimacy the 2 poets planned the *Lyrical Ballads*, that important landmark in Eng. literature. To the vol. Coleridge contributed 'The Ancient Mariner' and W. 'Tintern Abbey' and other pieces. The first ed. appeared in 1798. With the profits from it W. went with his sister and Coleridge to Germany, where they stayed at Goslar and he began the *Prelude*,



WILLIAM WORDSWORTH

a poem descriptive of the development of his own mind. It was planned as the first part of a great philosophic poem to be called *The Recluse*, but the work was never finished. He also wrote sev. shorter poems at this time, including 'Ruth' and 'Lucy Gray.' In 1799 he and Dorothy settled at Grasmere in the Lake District, setting up house in Dove Cottage, and in 1800 the second ed. of the *Lyrical Ballads* appeared, with W.'s revolutionary preface on the principles of poetry.

In the same year the death of Lord Lonsdale, and the settlement of certain claims that the Wordsworths had upon him, supplied enough for them to live on in the simple manner that suited them. In 1802, having first visited Calais to meet Annette, W. married his cousin Mary Hutchinson, who, like his sister, was to give him a lifetime of devotion. In the following year he visited Scotland, and began his friendship with Sir Walter Scott, and in 1805 he completed the

Prelude, which was not, however, pub. till after his death. Two years later he pub. a further collection of *Poems*, which contains some of his best work, including the 'Ode to Duty,' 'Ode on the Intimations of Immortality,' 'Yarrow Unvisited,' and 'The Solitary Reaper.' In 1813 the Wordsworths removed to Rydal Mount, where he spent the rest of his life, and in the same year he was appointed Distributor of Stamps for Westmorland at a salary of £400. In 1814 he pub. *The Excursion*, the middle part of his projected philosophic poem, made another visit to Scotland, and wrote 'Yarrow Visited.' A period of classical influence at this time was responsible for the poem *Laodamia*. Later works were *The White Doe of Eylstone*, 1815, *Peter Bell* and *The Waggoner*, both 1819, *The River Duddon*, 1820, and *Memorials of a Tour on the Continent and Ecclesiastical Sonnets*, both 1822. An annuity left him by Sir George Beaumont enabled him at this time to indulge his passion for travel, and he visited France, Belgium, Switzerland, and Italy, as well as making another Scottish tour, followed by *Yarrow Revisited and Other Poems*, 1835. In 1838 he received the degree of D.C.L. from Durham Univ., and in 1843 he succeeded Southey as Poet Laureate. Unhappily, from 1829 onwards his sister's health had been impaired, and in 1847 he lost his daughter Dora, and never recovered from the blow. He was buried in Grasmere churchyard.

W. was not only one of the greatest of Eng. poets, but had an exceptional importance in the development of Eng. literature. The *Lyrical Ballads*, it may be said, ushered in the Romantic Revival and fundamentally changed the whole conception of poetic values in this country. There had, of course, been earlier revolts against the rigid rules of the Augustans, but W.'s famous *Preface* was the first formulation of definite and determined opposition to those canons of taste that had held Eng. poetry in fetters for a cent. and a half. The school of Dryden and Pope followed Lat. models, and used a stereotyped poetic diction derived from them; hence W.'s contention that poetry should use the language of ordinary speech appeared to them the rankest heresy, and his principles were vehemently denounced. It is true that he himself does not always abide by them, but the general impression that his poetry gives is one of unadorned simplicity. Such lyrics as 'To the Cuckoo' and 'I Wandered Lonely as a Cloud' restored to Eng. poetry a clarity and reality from which it had long been divorced. They also illustrate W.'s second great gift to Eng. literature, his philosophy of a return to nature. He reawakened readers to the beauty of birds, trees, and mountains. Nature to him was something to be worshipped, so that even the meanest flower could inspire 'thoughts that do often lie too deep for tears.' This feeling of a mystic union with nature is found throughout his poetry, and above all in his 'Immortality Ode,' greatest of all Pindarics, which embodies the Neo-Platonist doctrine

of a pre-existence of which earthly beauty serves to remind us. With his nature poetry he estab. a tradition which has lasted over a cent. and put all later poets in his debt.

The standard ed. of W.'s *Poetical Works* is by E. de Selincourt and Helen Darbishire (7 vols.), 1940-9; there is also a later ed. by P. Wayne (3 vols.), 1955. The *Prose Works* were ed. by A. B. Grosart (3 vols.), 1876. The *Letters of William and Dorothy Wordsworth* were ed. by E. de Selincourt (6 vols.), 1935-9. See lives and studies by F. W. H. Myres, 1881; W. A. Knight, 1889; E. Legouis, 1896 (trans. 1897); W. A. Raleigh, 1903; H. W. Garrod, 1927; C. H. Herford, 1930; J. C. Smith, 1944; H. Read, 1949; Helen Darbishire, 1950; L. Abercrombie, 1952; also E. de Selincourt, *The Early Wordsworth*, 1936; Frederika Beatty, *William Wordsworth of Rydal Mount*, 1939; N. Lacey, *Wordsworth's View of Nature*, 1948; F. W. Bateson, *Wordsworth: A Re-interpretation*, 1955.

Work, in mechanics and engineering, is the effect produced in any mass by a force acting against inertia or resistance. The effect may result in strain or produce motion of the mass; in all actual cases the whole W. possible is distributed, only a portion of it becoming *useful*, a great deal being expended in overcoming friction, or, as in the case of steam and electricity, 'leaking' owing to the impossibility of controlling the direction of the force. In mechanical W. a ft.-lb. is the unit. Thus if a body of 2 lb. weight changes its level by 5 ft., the W. given out in falling, or received on rising, is 10 ft.-lb., neglecting friction, etc. The W. is measured as the product of resistance and the distance over which it is overcome. This is so whether the motion is direct, inclined, or curved. If in the case of a force of p lb. exerting a pull, the pull be not direct but inclined at an angle of θ to the resultant motion, the effective force is $p \cos \theta$. *Power* takes account of time; it is the time rate of doing W. One h.p. is the W. of 33,000 ft.-lb. done in 1 min. *Energy* is the capability of doing W. The metric unit of W. is the kilogrammetre; in the C.G.S. system, the unit is the dyne-centimetre or 1 *erg*. One joule (q.v.) = 10,000,000 ergs = 0.7373 ft.-lb.; 1 ft.-lb. = 13,563,000 ergs. *Resilience* is the W. done on a bar in producing stress, or the W. the bar will do in regaining shape when relieved from stress.

Workers' Educational Association, see ADULT EDUCATION; TRADE UNIONS; MANSBRIDGE, ALBERT.

Workhouse, see POOR LAW.

Workington, municipal bor., seaport, and mkt tn of Cumberland, England, 33 m. from Carlisle, on the R. Derwent. Its industries include coal mining, iron and steel manuf., heavy and light engineering, textile and carpet manuf. Harrington was incorporated in the bor. in 1934. Pop. 28,800.

Workmen's Compensation, system in force in England until 1946, whereby compensation was paid to persons injured

at work or, if they were killed, to their dependants. The principle underlying the Workmen's Compensation Acts (all of which are now superseded by the National Insurance (Industrial Injuries) Act, 1946) was that of the provision of weekly compensation in cases of injury at work without proof of negligence. Employers were not compelled to insure, except owners of collieries as from 1935, when the W. C. (Coal Mines) Act came into force. The principle of W. C. was introduced into English law by the Workmen's Compensation Act of 1897, prior to which Act the remedies available to the injured workman were either an action at common law or an action under the Employers' Liability Act, 1880. The Act applied to Scotland.

WORKMEN'S COMPENSATION ACT, 1897. This marked a great advance in the social obligations of masters and employers, and made them in effect insurers of employees against accidents. Proof of negligence was no longer required. The Act provided that a workman might recover compensation for personal injury caused by an accident 'arising out of and in the course of employment.' But it restricted the right to get compensation for injuries sustained in one or other of a list of notoriously dangerous occupations, and a further defect was that it did not apply to injuries to health caused by employment in noxious industries.

WORKMEN'S COMPENSATION ACTS, 1900 TO 1923. The Act of 1900 extended the scope of the Act of 1897 to employment in agriculture, but the earlier Workmen's Compensation Acts were repealed by the Act of 1906, which re-enacted their principles while omitting most of the above-mentioned limitations and exceptions. It gave the right to obtain compensation to all persons in regular employment (except soldiers, sailors, and policemen) whose remuneration was not over £250 a year. It also introduced the principle of including under the notion of 'accident' certain industrial diseases. The only defence left to the employer was where he could prove that the accident was due to the 'serious and wilful misconduct of the workman'—words which have given rise to a great number of decisions which are sometimes difficult to reconcile with each other. This defence did not apply in cases of death or serious and permanent disablements. The Act of 1923 considerably amplified the definition of 'workman' given in the Act of 1906 by including certain accidents happening when the workman was acting *contrary to regulations*.

THE WORKMEN'S COMPENSATION ACT, 1925. This Act consolidated the law and applied to all cases where the accident happened on or after 1 Jan. 1924. It repealed all the previous W. C. Acts, except a few sections of the Act of 1923. There were subsequent amendments.

The W. C. Act of 1925 gave the right to compensation for injury by accident 'arising out of and in the course of employment,' provided the injury disabled the workman for a period of at least 3

days from earning full wages and provided the injury was not attributable to the serious and wilful misconduct of the workman.

The compensation under the repealed W. C. Acts was payable to or for the benefit of the workman, but when death resulted from the injury to or for the benefit of his dependants. The expression 'workman' included any person (subject to certain specific exceptions) who had entered into or worked under a contract of service or apprenticeship with an employer, whether by way of manual labour, clerical work, or otherwise; and also a person engaged in plying for hire any vehicle or vessel which he had obtained from the owner of the vehicle under a contract of bailment (but not under a hire-purchase agreement) in consideration of a fixed sum or a share of the earnings. Nevertheless, the term excluded many other categories of persons. 'Employer' included any body of persons incorporated or unincorporated and the legal personal representatives of the employer; and also, where an employer lent the services of an employee temporarily to another employer, he none the less remained liable to pay compensation for an injury occurring to the workman during his temporary service.

As regards the application of the W. C. Acts to industrial diseases, compensation was recoverable only where the disease was one of those included in Schedule III (anthrax, lead, mercury, phosphorus, and arsenic poisoning, ankylostomiasis, etc.).

BEVERIDGE REPORT. The Beveridge Report (1942) on social insurance recognised that the existing system of W. C. had conferred great benefits in the past. On the other hand, the Report drew attention to many serious disadvantages. It referred to the contentious and costly method for settlement of disputes; the difficulties of the workman who was not assisted by a trade union or approved society in prosecuting a claim; the possibility of improper pressure on him to reduce his claim or to take up work for which he was not fit; the want of complete security for the payment of compensation; the difficulties of demarcation between industrial and non-industrial cases; the unsatisfactory provision made by lump-sum settlements; the high costs of administration over parts of the field; the inappropriateness of the system in cases of industrial diseases which develop over a long period or are of a recurrent nature; and the absence of any provision for medical and post-medical rehabilitation of the injured workman.

NATIONAL INSURANCE (INDUSTRIAL INJURIES) ACT, 1946. This Act, which repealed as from 5 July 1946 all but a few sections of the previous W. C. Acts 1923-45, gave legislative form to the basic principles set out in Cmd. 6551 (Pub. Sept. 1944 following the Beveridge Report) for an industrial injury insurance scheme. It changed the whole basis of legislative provision against industrial injury by accident by substituting a

system based on *loss of earnings*. The Act substituted for the W. C. Acts a universal and compulsory system of insurance against personal injury caused by accident arising out of and in the course of a person's employment and against certain specified diseases and catalogued injuries. An accident is deemed to arise 'out of and in the course of' an insured person's employment notwithstanding that he is, at the time of the accident, acting in contravention of any statutory or other regulations applicable to his employment, or of any orders given by or on behalf of his employer, or that he is acting without instructions from his employer, if: (a) the accident would have been deemed so to have arisen had the act not been done in contravention as aforesaid or without instructions from his employer; and (b) the act is done for the purposes of and in connection with the employer's trade or business. A disease or injury may be prescribed for the purposes of the Act in relation to any insured persons, if the minister of pensions and national insurance is satisfied that: (a) it ought to be treated, having regard to its causes and incidence and any other relevant considerations, as a risk of their occupations and not as a risk common to all persons; and (b) it is such that, in the absence of special circumstances, the attribution of particular cases to the nature of the employment can be estab. or presumed with reasonable certainty. The Act covers virtually all persons employed under contract of service, and also some special employments, such as fishermen. In 1957 a National Insurance (No. 2) Act was passed to increase contributions and benefits under (among other Acts) the National Insurance (Industrial Injuries) Act, 1946.

Rates of Contributions and of Disablement Pensions. Under the National Insurance (No. 2) Act, 1957, the basic weekly rate for injury benefit and complete disablement is 85s., with somewhat lower rates for those between 17 and 18, and under 17. The weekly rates of contributions payable by insured persons and employers are:

Description of Insured Person	Employee	Employer
Men over 18 .	8d.	9d.
Women over 18 .	5d.	6d.
Boys under 18 .	4d.	5d.
Girls under 18 .	3d.	3d.

Injury Benefit. An injured person is entitled to injury benefit in respect of any day on which, as the result of the injury, he is incapable of work during the injury benefit period (a period with a maximum of 156 days from the date of the accident); but he will not be entitled to benefit in respect of the first 3 such days, unless he is incapable of work during the period of not less than 12 days. Injury benefit is defined as an allowance payable at the weekly rate of 85s.; and the amount payable for any day of incapacity is

one-sixth of the weekly rate (i.e. of 85s.); but if the beneficiary is under 18 and not entitled under the Act to an increase of benefit in respect of a child or adult dependant, his (or her) weekly rate is 63s. 9d. while he is between the ages of 17 and 18 and 42s. 6d. while he is under 17.

Disablement Benefit. An insured person is entitled to disablement benefit if, as the result of an industrial accident or prescribed disease, he is suffering from a loss of physical or mental faculty assessed at 1% or more. Where the assessment is 20% or more a pension is payable proportionate to the degree of the disablement. The weekly rates of disablement pension range from 85s. per week for 100% disablement to 17s. for 20%. When the full extent of disablement is assessed for the period taken into account as amounting to less than 20%, disablement benefit will be in the form of an industrial disablement gratuity, of an amount fixed according to the length of the disablement period and the degree of disablement, but not in any case exceeding £280.

Increase of Disablement Benefit. Where the injured workman, as a result of the relevant accident, is unable to return to his regular occupation or to undertake work of an equivalent standard, disablement benefit may be increased by the payment of a special hardship allowance (maximum 34s. a week). There is also provision for increases of disablement benefit on account of permanent unemployability, hospital treatment, need for constant attendance, and, under certain circumstances, child and adult dependants.

The Act makes special provision for certain increases to claimants under the Workmen's Compensation Act who remain totally incapacitated and who are still in receipt of weekly payments for such incapacity. These increases cover unemployability supplement and the need for constant attendance. In addition, the Workmen's Compensation (Supplementary) Act, 1956, grants a supplementary payment of 17s. 6d. weekly to claimants still in receipt of compensation for total incapacity due to the old injury.

Death Benefits. The weekly rate of pension payable to the widow of the deceased (provided that she was living with her husband at the time of his death) will be at the rate of 56s.: (a) for any period for which she is entitled to an allowance under the Act in respect of a child of the deceased's family or has a young person under 18 residing with her; (b) if she was over 40 years of age at deceased's death or has reached 40 during a period for which she was entitled to such an allowance; or (c) where the widow at the deceased's death was permanently incapable of self-support: and in any other case the rate will be 20s. In the case of a widower the pension for life is 56s. weekly if he was being wholly or mainly maintained by his wife and was permanently incapable of self-support. A parent of the deceased is entitled to

death benefit if at the deceased's death he was being to a substantial extent maintained by the deceased, or would, but for the relevant accident, have been so maintained. Provision is also made for children of the deceased's family, and also for dependent relatives of the deceased, and for women having the care of the deceased's children. Death benefit is also payable to a widow who was not residing with her husband at the date of death, provided that she is receiving, or is entitled to receive, from him periodical payments for her maintenance to the extent of not less than 5s. weekly. The rate of pension payable is the standard rate or the weekly amount she received (or was entitled to receive) for her maintenance, whichever is the less.

DEFENCE OF COMMON EMPLOYMENT. REPEAL OF EMPLOYERS' LIABILITY ACT. DAMAGES FOR PERSONAL INJURY OR DEATH IN A COMMON LAW ACTION. The Law Reform (Personal Injuries) Act, which is related to the National Insurance (Industrial Injuries) Act, 1946, taken with the Contributory Negligence Act of 1945 and the Crown Proceedings Act, 1947, effected a long-needed rationalisation of the law relating to injuries and negligence—though the first-named Act, contrary to the recommendations of the Departmental Committee appointed after the publication of the Beveridge Report, is confined to injuries associated with employment instead of being applied, where appropriate, to injuries of every kind. When 'workmen's compensation' was superseded by a system of benefits provided through compulsory insurance and payable regardless of anyone's 'negligence,' the question naturally arose whether the workman who also succeeds in recovering damages at common law should receive both insurance benefits and damages in full, or whether the latter should be reduced by the amount of his benefits. These and cognate questions were referred to the Departmental Committee, whose recommendations are the basis of the Law Reform (Personal Injuries) Act. That Act abolishes the defence of common employment and repeals the Employers' Liability Act, 1880. The Act also provides that in an action for breach of statutory duty the employer shall not be liable to damages for personal injuries or death if it can be shown 'that it was not reasonably practicable to avoid or prevent the breach.' The third clause of the Act provides that in fatal cases and in those of prolonged or permanent injuries, only half the value of (insurance) benefits under the National Insurance (Industrial Injuries) Act, 1946 (partly amended by the provisions under the National Insurance (No. 2) Act, 1957), up to 5 years from the date of the injury shall be taken into account by the Court in assessing damages in an action for damages for personal injuries (including any such action arising out of a contract). The Act provides that the expression 'personal injury' includes any disease and any impairment of a person's physical or mental condition. The fifth and last

clause provides that the Act shall bind the Crown (i.e. the gov.) as an employer. See Lord Halsbury, *Laws of England*, 1907-17, 1931; A. Wilson and H. Levy, *Workmen's Compensation* (2 vols.), 1939-41; and W. A. Willis, *The Workmen's Compensation Acts, 1925-1943*, 1945, with supplement, 1946.

Works, Ministry of. Although the history of the dept can be traced back through a long period, it was not until after 1852 that it became known as H.M. Office of Works. Its prin. functions were the provision, furnishing, and maintenance of accommodation for civil depts and of the H.Q. of service depts; care and maintenance of royal palaces, the Houses of Parliament, embassies and legations abroad, certain museums and art galleries; the preservation of anct monuments; and the management and maintenance of royal parks. In 1940 the dept was given new and important responsibilities relating to the building and civil-engineering industries, and received the title of the Ministry of Works and Buildings, subsequently amended to Ministry of Works. In addition to the old 'Office of Works' functions the ministry is responsible for the general oversight of the building and civil-engineering and the building-materials industries and for consultation with the representatives of these industries. Its duties include collecting statistical information for the purpose of assessing the load of work and the trends of activity in the building and civil-engineering industries; publicising the results of building research and fostering their application in the interests of increased productivity; and a general responsibility for the supply and distribution (including export) of building materials.

Works Agency, Federal (U.S.A.). created by the President's reorganisation plan of 1939 and executive order 9357 of 30 June 1943, transferring the functions and powers of the Public Works Administration and of the Commissioner of Public Works to the offices of the Federal Works Administrator (where they were put in process of liquidation). The F. W. A. was estab. to consolidate those agencies of the Federal Gov. dealing with public works not incidental to the normal work of their depts and which administered federal grants or loans to state and local govts. or other agencies for the purposes of construction. It was abolished by Act approved 30 June 1949, and its functions transferred to the General Services Administration.

Works Councils, see INDUSTRIAL WELFARE.

Works Representatives, see SHOP STEWARDS.

Workshops Acts, see FACTORY LEGISLATION.

Workshop, mrkt tn and bor. of Notts, England, on the Ryton. Its par. church, which formerly belonged to an Augustinian priory, is a fine cruciform building. W. is a mining centre, with chemical, timber, glass, and malting works and an important cattle mrkt. Pop. 32,590.

World, see EARTH.

World Bank, popular name for the International Bank for Reconstruction and Development (q.v.).

World Calendar. The following is a brief outline of the scheme for the W. C. Each quarter consists of 91 days or 13 weeks, and each year, half-year, and quarter commences with a Sunday and ends on a Saturday. Jan., April, July, and Oct. each contain 31 days; Feb., May, Aug., and Nov. each contain 30 days; and Mar., June, Sept., and Dec. each contain 30 days. This would make a year contain only 364 days, but 31 Dec. is named World's Day and is a world holiday. In Leap Years the additional day is placed on 31 June and is another world holiday. By using these stabilising dates the calendar will be able to have the same day and date arrangement every year, each year being complete in itself. While economic planning would be greatly simplified by the W. C., there is considerable opposition to it, more especially on the part of certain religious bodies, and it is not very likely that this calendar will be accepted in the near future. Literature on the subject can be obtained in various countries; in Great Britain from 20 Buckingham St., London, W.C.1.

World Council of Churches. Movements towards Christian unity and to promote common action by the Churches are expressing themselves in various organisations, of which the W. C. of C. is one. The H.Q. of the W. C. of C. are in Geneva: the Archbishop of Canterbury (Dr Fisher, q.v.) is a member of the central committee. The general secretary is Dr Visser 't Hooft, and the Council held its first assembly in Amsterdam in Aug. 1948, at which there were representatives from about 150 Churches. The Rom. Catholic Church was not represented.

World Health Organization. International body charged by the U.N. with responsibility for all the international aspects of health. The constitution for the organisation was signed on 22 July 1946, and it came into effect in 1948, its status as a specialised agency of U.N.O. being recognised in 1950. It now has over 80 members. Its constitution states: 'Health is a state of complete physical, mental, and social wellbeing and not merely the absence of disease or infirmity. The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition.' The international quarantine measures to prevent the entry of, e.g., yellow fever, into the U.S.A., of smallpox into Britain are administered by W.H.O. Another important activity of the organisation is to estab. international standards for drugs, sera, and vaccines. Another function of the body is to draw up a common technical language for doctors in all countries. W.H.O. works in an advisory capacity only, its policy being to assist countries—mainly by arranging for the loan of personnel on a temporary basis—in developing their own health programmes. W.H.O. is governed

by a general assembly, representative of member nations, which meets annually, and an executive council, which meets more frequently. In 1956 there were 78 member countries and 1 associate member country. Russia rejoined in 1955, having withdrawn in 1949. Administration of W.H.O. is carried out by an international staff of whole-time officials under a Director-General (Dr M. G. Candau, Brazil). The H.Q. of W.H.O. is in the Palais des Nations, Geneva, Switzerland, and there are regional offices in various parts of the world. It has a library of 27,000 volumes and 1300 current periodicals. Publications: *Bulletin of the World Health Organization* (monthly), *Chronicle of the World Health Organization* (monthly), *International Digest of Health Legislation* (quarterly), *Epidemiological and Vital Statistics Report* (monthly), *Weekly Epidemiological Record*, *W.H.O. Newsletter* (monthly).

World Medical Association, founded in 1947. Its objects are to promote closer ties among the national medical organisations and the doctors of the world, to maintain the honour and interests of the medical profession, to study and report on professional problems confronting the profession in different countries, to organise an exchange of information on matters of interest to the medical profession, to establish relations with the World Health Organization (q.v.) and other appropriate bodies, and to assist all peoples of the world to attain the highest possible levels of health. The unit of membership is the national medical association of a country or territory. In 1957, 53 national associations were members. The W.M.A. publishes *World Medical Journal*; it holds an annual meeting in one of its member countries (1957, Turkey). Its H.Q. are at 10 Columbus Circle, New York 19, U.S.A.

'World-Telegram and Sun', New York daily newspaper, which originated as the *New York World*, 1860, and later amalgamated with the *Telegram*, 1931, and the *Sun*, 1950. See 'NEW YORK WORLD.'

World War, First. This account treats of the First World War as a whole. Military operations are treated in detail under the various fronts or theatres of operations. Detailed accounts of European diplomacy and policy during and after the War will be found under EUROPE; while the effect of the War on the internal politics of the different nations is treated under the name of the nation concerned. See also the individual articles on the persons and places named.

CAUSES. *Intense Nationalism—Industrial Unrest.* In the early years of the 20th cent. the countries of W. Europe had reached a high degree of material progress and prosperity. The great advances of scientific discovery had revolutionised industrial processes and brought great wealth to leading industrialists. There had been a corresponding improvement in the conditions of life of the wage-earners, though the parade of luxury by the rich laid the seeds of a resentment

which was shown in strikes and occasional industrial unrest, and also in political action by the workers.

The political organisation of the workers was becoming identified with their industrial organisation in trade unions, and the entirely material objects of the organisations in the shape of higher wages and better working conditions led directly to an intense nationalism which counteracted the political movements. Trade unionists of one country saw the prosperity of their own trades threatened by the activities of foreign traders, and were ready to support tariffs designed to limit foreign competition. Tariff barriers led to trade jealousies between different nationals, and, combined with inherent political jealousies, constituted a latent danger to European peace. A greater element of danger, however, lay in trade expansion and the struggle for privileges in newly developing 'backward countries' such as the Balkans, Asia Minor, N. Africa, and in rival efforts to secure 'the road to the E.'

Balance of Power—Secret Diplomacy. At the beginning of the 20th cent., balance of power in Europe was no longer stable. Since 1870 Germany had rapidly grown in military and industrial importance, and her imperial ambitions were regarded as menacing by Lord Lansdowne, then Brit. Foreign Secretary, who threw over the policy of isolation by concluding in 1902 the Anglo-Jap. Treaty (q.v.)—thereby relieving Great Britain of large naval commitments in the Pacific—and by negotiations with the Fr. Gov., leading to the 'Entente Cordiale' of 1903—a defensive arrangement, at first, rather than an alliance. This was followed by a number of secret agreements between different countries.

German Militarism. Emphasis was laid by the new rulers of Germany on 'blood and iron' and other incidental aspects of Bismarck's (q.v.) creed. The securing once for all of Germany's prestige was equally important to the great Ger. industrialists, for the efficient Ger. trade machine was built up on a none too stable system of credit. The Ger. people were not essentially 'militarist,' but the most pacific of them were uneasy over their country's economic future and predisposed to some great effort to obtain security, and in this they were led by the new class of industrial magnates, the Prussian squirearchy, and the army and navy chiefs, the 3 most potent elements in Germany on the eve of the War, and all of them dominated by ideals of conquest. The countervailing element should have been found in the party of social reform, but the Social Democrats were politically powerless, for the Ger. constitution gave them no means of making their influence a reality. Equally significant from the international standpoint was the Ger. fear of the Russian menace.

The Ger. empire wanted producing grounds for its raw materials, 'a place in the sun,' outlets in colonial possessions for its surplus people. A colonial empire must be guarded by a powerful navy, and

the Navy, in process of expansion, was now an obvious threat to Brit. sea-power. Ger. power must combine Central Europe into a formidable bloc, with an extension of influence into the Middle E., where oil-fields were of rapidly increasing importance. Such were some of the theories underlying Prussian policy as expounded by the emperor; but his spectacular landing in Morocco in 1905 and proclamation of Germany's intention to take the Sultan under her protection was followed by the diplomatic defeat of Germany at the Algeiras (q.v.) Conference, when Germany found herself deserted by every Power save Austria-Hungary. Germany was more successful in 1908 in supporting Austria when, on the overthrow of the old régime in Turkey, Austria seized the Turkish provs. of Bosnia and Hercegovina, which she had long administered. This action roused the apprehensions of Russia and Italy; but neither Russia nor Italy was in a position to take armed action. In 1911 Morocco gave Germany further occasion for self-assertion. There had been a revolt in Fez, and the city had been occupied by Fr. troops. Germany saw her chance to acquire a Ger. sphere of influence in Morocco, and the emperor dispatched the gunboat *Panther* to Agadir in W. Morocco. Britain then sent a warship to Agadir, and under international pressure Germany retired.

Effect of the Agadir Incident. This incident caused resentment in Germany against France and Great Britain, and from that date the war party in Germany was supreme. This fact was not, however, generally recognised. In 1914 the war party was in control of Ger. policy, awaiting a suitable opportunity for war; but the emperor probably did not realise the full implication of its attitude. Germany had to dominate Austro-Hungarian policy if she were to realise her dream of a solid bloc of Ger. influence through Central Europe towards the Middle E., which had been threatened by the successes of Serbia in the Balkan war. The aged Austrian Emperor, Francis Joseph, was content to rest his tottering throne on the might of Ger. arms, and Austria would never have taken the steps which plunged Europe into war if she had not been assured of Ger. support.

The Sarajevo Murder. The actual occasion for war was in itself comparatively insignificant. The Austrian Archduke Francis Ferdinand (q.v.), nephew and heir of the emperor, and his wife, were assassinated by a Bosnian student, Gavriló Príncipe, at Sarajevo, the Bosnian cap., on Sunday 28 June 1914. (See also SARAJEVO.) On 5 July a meeting took place at Potsdam, the result of which was that Germany promised to support Austria in whatever demands she might make upon the Serbian Gov. Russia alone of the Entente Powers had taken alarm at the possible international effect of the murders, and about this time a warning was sent to Vienna by Sazonoff, the Russian Foreign Minister, that any unreasonable demands by Austria upon Serbia could not leave Russia indifferent.

But in spite of this warning, and of the report of the official Austrian investigator that the complicity of Serbia in the crime was not proved, the Austrian Gov. presented a drastic ultimatum to Serbia on 23 July, requesting a reply within 48 hrs. On the advice of Russia, Serbia, on the 25th, agreed to all the demands save 2 which clearly conflicted with her authority as a sovereign state. Serbia suggested that these 2 points should be referred to the Hague Tribunal. Austria-Hungary immediately informed Serbia that the reply was not satisfactory. The Austrian minister and his staff left Belgrade, and Austria-Hungary mobilised her S. armies and moved them towards the Serbian border.

EVENTS IMMEDIATELY PRECEDING OUTBREAK OF WAR. Diplomatic Exchanges. The week that followed the Austrian mobilisation was filled with frenzied diplomatic efforts to avert the widening of the area of conflict. Their efforts, however, failed, owing to the refusal of Germany to co-operate.

Mobilisations. Austrian Attack on Belgrade. On 29 July Russia mobilised her forces in the dists. nearest to Austria. On the same day Austria began the bombardment of the Serbian cap., Belgrade; the Ger. High Sea Fleet was recalled from the Baltic; Belgium began to prepare her defences; and concentration of the Brit. fleet began. Germany informed Russia that her partial mobilisation would compel Germany to mobilise, and this was represented by the inept Ger. ambas. in St Petersburg, Count Potkale, as an ultimatum meaning war. On the same evening the Ger. emperor and his advisers resolved to declare war on France and Russia; but before doing so they offered an assurance to the Brit. ambas. in Berlin that, provided the neutrality of Great Britain was definite, the Ger. Gov. 'aimed at no territorial acquisitions at the expense of France should they prove victorious in any war that might ensue.' Sir Edward Grey rejected these terms, as he was bound to do, but still delayed advising the Brit. Cabinet to take any step which might involve Britain in war.

On the following morning, 31 July, news of the general Russian mobilisation reached Berlin, and Germany at midnight presented an ultimatum to Russia. At the same time Germany asked France for a notification by 1 p.m. the following day whether she intended to remain neutral in the event of a Russo-Ger. war. It was essential to the Ger. plan of campaign to involve France at the earliest possible moment, on the confident assumption that one swift blow would crush France and so leave the whole weight of the Ger. armies free to meet the Russians. War was now inevitable.

British Obligations towards Belgium. German Ultimatum to Belgium. When war between Germany and France seemed imminent, Sir Edward Grey asked for renewed assurances from both powers as to Belgian neutrality which both had guaranteed in 1839 (see QUINTUPLE TREATY). France gave the required

guarantee, but Germany's answer was evasive, and contained a suggestion that Belgium had already committed certain hostile acts against Germany. At the Brit. Cabinet meeting on the morning of 1 Aug. it was decided to notify Germany that Britain could not ignore any threat to Belgian neutrality. On the following day Germany committed her first act of war when Ger. troops crossed the frontier into the Grand Duchy of Luxembourg and seized its railway system. This small state was not only practically unarmed, but her neutrality had been guaranteed by France and Germany. That Sunday Ger. cavalry patrols crossed the border into Alsace as far as the vil. of Jonchéry and skirmished with Fr. pickets. Ger. dragoons raided the Fr. vil. of Saurce and took prisoner 9 Fr. peasants. Early on the Monday morning before the declaration of war there was a Ger. raid near Lunéville, and a fight between Fr. troops and Uhlans at Reméréville. France still behaved with restraint and kept her troops 6 m. behind the frontier. Meanwhile, on Sunday, Germany presented her ultimatum to Belgium in which she made the claim that the French intended to march through Belgium, and Germany must therefore herself demand a passage through Belgium in order to counter this Fr. move. If Belgium would agree to allow passage to the Ger. armies and preserve a benevolent neutrality, Germany would undertake to evacuate Belgian ter. at the end of the war and guarantee Belgian independence. Failing compliance, Germany would reluctantly be compelled to treat Belgium as an enemy. With the news of the Ger. ultimatum to Belgium, a change took place in the attitude of the Brit. Cabinet. At the Cabinet meeting on the Sunday morning, 2 Aug., Sir Edward Grey was authorised to assure France of Brit. naval support if the Ger. fleet came through the N. Sea or into the Eng. Channel to attack the Fr. coast. On Sunday evening the Prime Minister, Asquith, issued orders for mobilisation and summoned the Army Council to meet on Monday morning. On Monday Germany declared war on France. Early that morning Belgium had sent her reply to the Ger. ultimatum, boldly rejecting the Ger. proposals, and stating her intention to resist any attack upon her rights. At the Brit. Cabinet meeting on that morning, Winston Churchill, first lord of the admiralty, announced that the Brit. Navy was ready for war, and Lord Haldane announced the mobilisation of the Army. On the morning of Tuesday, 4 Aug., Sir Edward Grey advised Belgium to resist a Ger. invasion by force, and promised to join France and Russia in supporting her.

German Attack on Liège. Early that morning the Ger. invasion had begun. The frontier had been crossed at Gemmenich, and during the day Visé was burned and the forts at Liège were fired on. That evening Sir Edward Goschen presented Britain's ultimatum to Germany. No formal reply was given and at midnight on Tuesday, 4 Aug. 1914, a state

of war automatically came into being between Germany and Great Britain.

FIGHTING ON THE WESTERN FRONT IN 1914. Fall of Liège. Arrival of the B.E.F. The invasion of Belgium met with its first check at Liège, where the Belgians held up the Germans for 2 days in front of the city. The city was occupied on 7 Aug.; the forts around it were by 16 Aug. reduced by Ger. heavy howitzers. During the following week Ger. troops overran half Belgium. The main Belgian army fell back towards Antwerp, leaving Brussels unprotected, and the Germans entered the cap. on the 20th. The fortress of Namur, the last barrier between the Ger. advance and the N. frontier of France, was soon reduced by the Ger. heavy artillery. The greater part of the S. Belgian Army was destroyed in the fall of Namur, and this was the first conspicuous success achieved by the Germans in the War. Meanwhile the Fr. High Command remained in ignorance of the real weight of the Ger. drive. Acting on the Fr. theory that attack is the best defence, Gen. Joffre, the Fr. commander-in-chief, directed offensives into Alsace and Lorraine on 10 Aug. Both failed, and neither proved any distraction either to the Ger. right wing advancing through Belgium or to the Ger. centre advancing by way of Luxembourg and the Ardennes. The French had therefore made no effective plan to meet the threat of the Ger. advance through Belgium when the small Brit. Expeditionary Force of some 150,000 men under Sir John French reached France. The first 2 corps of this force took their place on the left of the Fifth Fr. Army near to Mons on 22 Aug. The first 2 Brit. corps of some 70,000 men came into contact with the Germans on Sunday the 23rd. On the 22nd the Fifth Fr. army had been attacked at Charleroi and had fallen back in some confusion. A breach was thus made in the Fr. line, and on the same day the Third and Fourth Fr. armies farther to the F. had also retreated, leaving the Germans free to attack the British in force. Owing to the confusion, no information of these retreats reached Sir John French, who faced the enemy under the impression that his troops formed part of an unbroken line, whereas they were completely isolated and facing a Ger. force 2 or 3 times the size of the estimate supplied by the French to the British when the latter took up their position.

The Battle of Mons. The British Retreat. The battle of Mons (q.v.) began with a bombardment from between 500 and 600 Ger. guns, and Sir John French, now learning of the withdrawal of the Third and Fourth Fr. Armies, ordered the evacuation first of Dinche and then of Mons itself. The Brit. retreat during the night was covered at dawn by a counter-attack by the 1st Div., which suggested to the Germans that the British had been reinforced and intended an offensive. The plan of the Brit. commander was to retreat to a line giving his troops the protection of the fortress of Maubeuge and the R. Sambre on the right;

but the protection of the Sambre was useful only if the French could hold the Meuse and von Kluck could not outflank the British on their left. In fact, von Kluck had seized Tournai and the Meuse had been forced, and the 3 Fr. armies were in full retreat. Sir John French therefore continued to retreat to Le Cateau (q.v.). At nightfall on the 25th the Brit. troops reached a line through Maroilles, Landreies, and Le Cateau to Serainvillers near Cambrai. Some fierce fighting ensued, and at last the British were able to regain touch with the Fifth Fr. Army to the E., with a new Fr. corps under d'Amade in the W., and also with another new Fr. Army, the Sixth, under Gen. Maunoury (q.v.) on the Somme. On the evening of Friday, the 28th, the Brit. 2nd Corps reached the R. Oise, and was reunited with Sir Douglas Haig's 1st Corps, which had marched through Guise. The Brit. Army was at last able to rest; by their remarkable endurance much had been saved, but many men, much material, and a considerable area of country had been lost. To the W., Ger. cavalry now swept across Belgium as far as the R. Lys and down towards Lille and Arras, with the object of cutting communications between the Brit. Army and its bases at Boulogne and Dieppe. So serious did the position appear to French, that he moved his base as far S. as St. Nazaire, the port at the mouth of the Loire. The Channel ports (q.v.) as far as the Seine lay open to the Germans; but they had other plans. They were intent on destroying the Fr. armies by a series of hammer blows, and hoped to dictate peace on their own terms before autumn. So far they had made rapid progress towards this object. The fall of Namur, the defeat of Lanrezac's Fifth Army at Charleroi, the battle of Mons, and the defeat of the French on the R. Semois had been followed by the rout of Ruffey's and Langle's armies on the Meuse. On 28 and 29 Aug. the Germans forced the crossing of the Aisne, and Rheims and Châlons were abandoned. On the 30th La Fère and Laon were also evacuated. The Brit. retreat continued through the forests of Villers-Cotterets and Compiègne towards the R. Marne.

British Halt at Grand Morin R. On 3 Sept. the British reached the line of the Marne, but abandoned it farther E. without resistance, and on the 5th the Expeditionary Force was concentrated behind the Grand Morin R. due E. of Paris and close to the city. Von Kluck's right wing began to veer away from Paris towards the SE. His object throughout was to outflank the Allied left, and to avoid the obstacle of Paris until he had accomplished his main purpose. Still there was no certainty that the Marne could be held, and the Fr. Gov. retired to Bordeaux in the SW. The French could feel secure on their right flank for the time being, for they were now in touch with their reserves, while the speed of the Ger. advance was slackened. Joffre decided to launch his offensive on 4 Sept.

Two new armies of reserves had been brought into the line, Foch's Ninth and Maunoury's Sixth, and 2 old armies had new commanders, Sarraill replacing Ruffey and Franchet d'Espèrey replacing Lanrezac. To the E., Castelnau and Sarraill stood almost back to back along the E. and W. heights of the Meuse above Verdun. On Sarraill's left was Langle's Fourth Army behind Vitry-le-François, and the line was continued westward by Foch's Army on the St. Gond marshes. That of Franchet d'Espèrey was linked by cavalry to the British, who were guarded by the Crécy forests; and on the Brit. left, stretching north-westward across the Paris front, was Maunoury's new Sixth Army. Von Kluck erroneously believed he had practically disposed of the British at Le Cateau and of Maunoury on the Somme, and that the Fifth Fr. Army had thus become the left wing of the Allies. By the night of 5 Sept. he had crossed the Marne, the Petit Morin, and the Grand Morin, and his patrols had reached the Seine.

The Battle of the Marne. The German Retreat. On Sunday 6 Sept., the first battle of the Marne began. It reached its climax on the 9th and was over by the 12th. Von Kluck, still acting on his mistaken assumption, invited disaster by marching across the front of the W. armies, which moved out to attack his flank. By the end of the week the Germans were driven back to a line running from the Oise beyond Compiègne to the Aisne, along that riv. to Berry-au-Bac, and across Champagne and the Argonne to Verdun. In Lorraine, also, Castelnau took the offensive and drove the Germans back from Nancy to beyond the Meurthe, and out of Lunéville and St. Dié. The Ger. right had fallen back 35 m. and the centre nearly 50; but their losses had been small. The battle was important because it frustrated the Ger. plan to destroy the Fr. armies, and so made certain a long war in which increasing advantage was to be on the side of the Allies. The retreat of the Germans from the Marne had taken them across the Aisne, and the Allies followed up their advantage on 13 Sept. by attacking the Ger. positions along the line of the Aisne.

The battle of the Aisne (q.v.) began on 13 Sept. Both the British and French crossed the riv. at sev. points, but were unable to dislodge the Germans from the high land beyond. The Germans had the advantage in position, and Joffre accordingly extended his left by the creation of 2 new armies holding a line as far as Arras and Lens. At the same time the Germans attempted to get behind the Fr. right in the Verdun area, but only succeeded in establishing a large salient which they were destined to hold for 4 years.

Trench Warfare and Stabilisation of the Front. The lines began now to be stabilised between Rheims and the Alps, and

A map of the First Battle of the Marne is printed in the article
MARNE. BATTLES OF THE

both sides settled down to trench warfare, an almost entirely new method in which all old theories of war were discarded. Between Rheims and the sea the month of Oct. was spent in a struggle to determine where that part of the line would become stabilised. The Germans moved great masses of their best troops to the W. area because they now realised that the Brit. Army was to prove an increasingly formidable opponent. Falkenhayn (q.v.) superseded von Moltke as Chief of the Imperial General Staff. Early in Oct. the Brit. Army was transferred to Flanders, close to its bases, to meet the Ger. threat to the channel ports. During the fortnight of the Brit. transfer, the French had to bear heavy attacks in the W., with varying success. The struggle, which had begun as attempts at out-flanking movement on both sides, soon developed into a race to reach the coast so as to establish the final position at as favourable a point as possible.

Belgian Resistance and German 'Frightfulness.' The Allies hoped to be able to make a connection with the Belgian Army in Antwerp, which all this time had kept large Ger. forces occupied with raids. The Belgian successes so seriously interfered with their plans that the Germans were provoked to vigorous methods, characterised in the Allied press as 'frightfulness,' in order to overawe the Belgians, but the only effect of these methods was to stiffen the Belgian resistance. Among these measures was the systematic destruction of Louvain, with its auct. univ. and library. On 28 Sept. the Germans began the siege of Antwerp.

Fall of Antwerp. First Battle of Ypres. The ring of forts round Antwerp failed to hold up the Germans, and the evacuation of the city began by land and sea on 1 Oct., and on the 10th the Germans entered the almost deserted city. In fixing the lines along which the opposing armies were to remain, with small fluctuations, for 4 years, the Brit. Navy played an important part, for the guns of 3 shallow-draught monitors from 18 to 28 Oct. swept the Belgian coast for 6 m. inland and held up the Ger. advance on Nieuwpoort. But still more decisive in stopping the Ger. advance was the action taken by the Belgians when they opened the sluices of the Yser at Dixmude and allowed the water to flood the country over which the Germans were advancing. The Belgians on the line from Nieuwpoort to Dixmude were protected by an impassable sheet of water. The Germans succeeded in capturing Dixmude on the E. bank of the Yser, but they were unable to cross the riv. Meanwhile a great battle had been waged around Arras, where the Germans tried to break through in the hope of isolating the Brit. Although the tn was reduced to ruins, the French finally drove

back the Germans on the 26th. At the same time a prolonged and confused battle was ranging round Ypres. The final attack on Ypres itself began on the 21st (see YPRES, BATTLES OF). With the arrival of reinforcements for the French on 17 Nov., the Germans gave up their attempt to break the line, which now settled down for the winter.

Results of the Campaign. Germany had secured the great mining and other industrial resources of Belgium and some of the coalfields of N. France, and the loss of these was to put a great strain on the Allies and prolong the War. Brit. and Fr. losses had been very heavy, and time was needed to renew them. The chief difficulty for Britain was to train and equip the masses of recruits from all parts of the empire in a short space of time. The Territorial Army, created by Lord Haldane, provided the first line of reserves, its members volunteering almost without exception for foreign service. From all parts of the empire, also, recruits were arriving. Indian troops fought at Ypres, and the first Canadian contingent landed at Devonport on 16 Oct., to be followed by thousands from Australia and New Zealand and finally from S. Africa, where for the moment the task of repressing rebellion and fighting in Ger. SW. Africa kept the S. African volunteers occupied.

THE EASTERN FRONT 1914. Russian Invasion of East Prussia. It had been generally assumed that Russia's unwieldy masses could only be moved very slowly, but that later on her immense resources of men and material would prove formidable. In the event Russian troops invaded E. Prussia almost as quickly as Ger. troops invaded France and Belgium, and by the end of the first week in Aug. a flight towards Berlin had begun. Russia's Polish prov. was an almost impossible salient to defend, and her first need, therefore, was to attack on the flanks in E. Prussia and Galicia, in order to straighten her front. The Russian armies were under the supreme command of the Grand Duke Nicholas, who was one of the very few officers of royal blood to prove himself a competent professional soldier, and Rennenkampf was the gen. in command of the Russian First Army in the E. Prussian campaign. On 20 Aug. the Russians captured Gumbinnen, and Rennenkampf occupied an important railway junction at Insterburg, while on the 21st Samsonov, commanding the Russian Second Army operating to the S. in E. Prussia, turned the Ger. right and drove them back on Königsberg to join the fugitives from Rennenkampf's attack. By the 25th E. Prussia was open to the Russians, and alarm in Berlin was intense. Meanwhile, Austria, although she had a million troops in Galicia, had failed to secure more than a strategic retirement of the Russians by her offensive against Lublin, and the Russians under Ruzsky and Brussilov (q.v.) had overrun the E. borders and menaced Lemberg (Lvov). But the Russian advance into E. Prussia had reached its farthest point. The Ger-

*A Map of France and Flanders
1914-18*

*is printed in the article
FRANCE AND FLANDERS, FIRST
WORLD WAR, CAMPAIGNS IN*

mans withdrew the incompetent Gen. von François, and replaced him by Paul von Hindenburg, with Ludendorff as his chief of staff. On the 31st he practically annihilated the Russian forces under Samsonov at the battle of Tannenberg (q.v.).

German Invasion of Russian Poland—Russian Advance into Galicia. Rennenkampf, with his communications now threatened, was compelled to retreat over the frontier and the invasion of E. Prussia had disastrously failed. Hindenburg now advanced across the Russian frontier without encountering any great resistance on a broad front from Wirballen on the left to Augustowo (Augustow) on the right, and occupied Suwalki, the cap. of the frontier prov., without resistance. But in the S. the position was much more favourable to Russian arms. (See RUSSIAN FRONT (FIRST WORLD WAR), CAMPAIGNS ON.) Gen. Brussilov, advancing from the S., captured in succession Tarnopol and Halicz, and forced his way across the series of rvs. guarding the right flank of Lemberg, and on 1 Sept. the battle of Lemberg began. The city fell on 3 Sept., and the whole Austrian Army then fell back behind the Vistula and the San. Von Auffenberg, who had defended Lemberg, withdrew to the fortress of Przemyśl, and the whole of the rest of Galicia was in Russian hands by about the date of the battle of the Marne in the W., so that the combined strategy in E. and W. had achieved substantial results for the Allies. Meanwhile Hindenburg in the N. continued his advance into Russia until he reached the Niemen; but there the vigorous Russian artillery attack and the inability of the Germans to find emplacements for their guns in the marshy ground checked him. The check became a retreat on 27 Sept., a retreat during which the Russians inflicted heavy losses.

The Struggle for Cracow. By 1 Oct. the Russian cavalry were again across the Ger. frontier, Jaroslaw fell and Przemyśl was invested, and Hindenburg was called S. to Poland to repel the Russian advance on Cracow. The need was urgent, for the possession of Cracow would open the door to Silesia, and give access to Vienna. Ruzsky was now in command in Poland, and Ivanov, with Brussilov and Dmitriev as his lieutenants, in Galicia. Hindenburg's plan was to attack along the radial railway lines leading to Warsaw from Thorn (Torun), Kalisch (Kalisz), and Czeszochowa, while the Austrians made an advance through Galicia, relieved Jaroslaw and Przemyśl, and recovered Lemberg. The Grand Duke Nicholas foresaw Hindenburg's intentions, but concealed his own counter-plan by giving the appearance that he was about to retire from the Polish salient. Actually he proposed to hold a position behind the line of the Vistula, except for Warsaw, which stands on the l. b. of that riv., and to counter-attack round the N. of the Ger. left wing under the great fortress of Novo Georgievsk. On 13 Oct. he made this surprise move, forced back the Ger. left, and threatened the Ger. centre.

By 3 Nov. the Germans were in retreat, abandoning even Łódź, and destroying communications as they withdrew. The Austrians whom Hindenburg had come S. to help were more successful in their offensive, recovering Jaroslaw, relieving and reinvictualising Przemyśl, and threatening Lemberg; but the Ger. retreat to the N. then compelled the Austrians to retire in Galicia. The Russian advance on Cracow was resumed, and by 9 Nov. their cavalry was only 20 m. from the city. A week before the Prussian Guard made its final attack at Ypres, Belgians had reported the moving of masses of Ger. troops away to the E. The need was urgent, for Cossacks were already across the Silesian border, and Hindenburg required all the help he could get for a counter-offensive. He was planning an attack up the Vistula from Thorn so as to attack the right flank of the Russian advance through Poland on Silesia and Cracow. The command was given to Mackensen. The Germans attacked all along the line on 18 Nov. against Ruzsky. The Russian centre was broken, and the left thrust back upon Łódź. But the wedge driven into the Russian line was not wide enough and the sides held fast, and Ruzsky began to close the Germans into a trap. For 3 days, 24 to 26 Nov., they fought desperately to extricate their forces, and at length the remnant succeeded. Meanwhile the Germans were rushing troops to Mackensen, and on 6 Dec. the Russians withdrew from Łódź in order to straighten their line against the attack Hindenburg was preparing on Warsaw. But the Ger. advance was now held, and the Germans spent Christmas in the trenches, 35 m. from Warsaw. Meanwhile the Hungarian advance in Galicia, which was another part of Hindenburg's plan, met with better success, and the Russians were driven back from Cracow, but with reinforcements they swung forward again.

German Attack on Warsaw. During Jan. 1915 the Russian centre in front of Warsaw was weakened in response to requests from the W. Allies that Russia should divert Ger. troops from the W. front by attacks on the extreme flanks of the Ger.-Austrian lines in the E. There was a fresh advance towards the Masurian Lakes in E. Prussia, and far to the S. Alexeev captured a Carpathian pass. Mackensen took advantage of this dispersal to make a fierce attack on the Russian centre. The attack began on 1 Feb., but the Russians were able to hasten reinforcements by the 2 lines of railway which ran N. and S. of the threatened front, and the Ger. advance was stopped. Hindenburg now gave up the idea of a frontal attack and tried to repeat his attempt on the N. flank to pierce the great chain of fortresses which defended Poland along the line of the Niemen and the Narev from Kovno to Novo Georgievsk. In this he was not successful, and by the middle of Mar. had withdrawn his left and centre to cover the Prussian frontier. On the Carpathian front, Russia, endeavouring to bring

Rumania into the war on the Allied side, sent a force into the Bukovina. On 22 Mar. Przemysl surrendered to the Russians. After the fall of Przemysl the Russians were free to make further assaults on the Carpathians, at first with success; but the Germans had taken charge of the Carpathian front and had sent enormous reinforcements there, while the weakness of Russia in guns and material was beginning to make itself felt.

SERBIA IN 1914. Austria's difficulties had not been confined to the Russian front. Her 'punitive expedition' against Serbia (q.v.) had been disastrously unsuccessful. By 6 Dec. the whole Austrian Army was broken and in flight. They suffered 80,000 casualties before they were driven back from Serbian soil, leaving Belgrade once more in the hands of the Serbs.

SOVEREIGNTY OF THE SEAS AND AIR RAIDS. *German Seaborne Commerce Destroyed.* The control of the seas did not ensure complete protection of all the Allied coasts from Ger. raids, but it did ensure freedom of movement for the Allies at sea, and its chief importance was an economic one, enabling the Allies to draw for their supplies upon the whole world, while denying the same advantages in provisioning to the Central Powers. The Ger. High Sea Fleet had withdrawn to its bases on the outbreak of war, and the Ger. plan was to wear down the Brit. Navy by a war of attrition with submarines and mines.

Meanwhile the Brit. Grand Fleet under Adm. Sir John Jellicoe (q.v.) was compelled to operate in the N. Sea from inadequate bases, while the outlying cruisers in various parts of the world cleared the Ger. mercantile marine from the seas. Some Ger. merchant vessels escaped to neutral ports; but hundreds were made prizes. In a very short time Ger. seaborne commerce ceased to exist. A few Ger. cruisers and armed merchantmen were still at large, and one Ger. Dreadnought, the *Goeben*, with a cruiser, the *Breslau*, escaped to take part in the war later on. (See 'GOEBEN' and 'BRESLAU'.)

Mines and submarines proved from the first the greatest danger to Brit. shipping. The Germans adopted the method of laying loose mines, which involved risk to neutrals and belligerents alike. The first serious naval action by the British during the War was the fight in the Bight of Heligoland on 28 Aug., in which Vice-Adm. Beatty's battle-cruisers came up to support Brit. light craft and, successfully penetrating the mine-fields, sank the Ger. cruisers *Muine* and *Köln*. Meanwhile Japan had called upon Germany to evacuate her Chinese naval base at Tsingtao in the Kiao-chow peninsula, and to send her warships out of Far E. waters. The Ger. Pacific squadron under Adm. von Spee left Tsingtao in anticipation of the capture of that port by the Japanese, an event which actually took place on 7 Nov. Already Australian troops had occupied Ger. New Guinea, the Bismarck

Archipelago, and the Gilbert and Caroline Is., while Samoa surrendered to a New Zealand force, and the Marshall Is. to Japan. Von Spee was thus left without a naval base, and he steamed eastwards across the Pacific, detaching 2 of his cruisers, the *Königsberg* and *Emden*, to help the Germans in E. Africa and to raid Brit. commerce in the Indian Ocean. On 20 Sept. the *Königsberg* sank H.M.S. *Pegasus* at Zanzibar, but was soon entrapped in the Rufigi R. The *Emden*, under Capt. Müller, remained to demonstrate the possibilities of a solitary raider commanded with gallantry. (See 'EMDEN'.)

Battle of Coronel—Battle of Falkland Islands. Meanwhile von Spee had gained the S. Amer. coast and found shelter in its harbours and is. His squadron of 2 large and 3 small fast cruisers was opposed on 1 Nov. off Coronel by Adm. Cradock with a mixed squadron of old and slow vessels. Adm. Cradock and 1600 officers and men lost their lives in this action (see CORONEL, BATTLE OF). Lord Fisher (q.v.) as first sea lord of the Admiralty took prompt measures to avenge the defeat. On 5 Nov. he dispatched a squadron under Adm. Sturdee, comprising 2 battle-cruisers and 4 lighter cruisers. They picked up the *Glasgow* in the S. Atlantic, and the *Canopus* at the Falkland Is., which Sturdee reached on 7 Dec. Unaware of the presence of Sturdee's squadron, von Spee approached the Falkland Is. on 8 Dec. to be chased by Sturdee, who sank all his vessels, with the exception of the *Dresden*, which was sunk in Mar. 1915 (see also FALKLAND ISLANDS, BATTLE OF). The last Ger. cruisers outside their own harbours were now destroyed, and naval action was restricted to blocking the exits from the N. Sea and preventing Ger. raids from their bases. Meanwhile on 29 Oct. Bedouins invaded the Sinai Peninsula, while Turkish gunboats raided Odessa, and on 1 Nov. the Brit. ambas. left Constantinople, being unable to outbid the Germans for the support of the Turkish leaders. The first effects were seen in Egypt, where the Khedive threw in his lot with the Turks and was deposed in his absence, the British assuming the protectorate; and in Cyprus, which the British had occupied since 1878, but which they now formally annexed.

German Colonial Empire Conquered. The smallest African outpost of Ger. colonisation, Togoland, surrendered on 27 Aug. The Cameroons, larger in area than Germany, repulsed the first Allied attack; but on 27 Sept. co-operation between Fr. troops and Brit. warships effected the capture of the cap., Duala, and the whole coast-line. The conquest of Ger. SW. Africa was much more difficult, and was delayed by a serious revolt in the Union of S. Africa, organised by the Boer leader, Maritz, with assistance from de Wet and Beyers. Gen. Botha took prompt steps to deal with the outbreak, and after small rebel successes de Wet was captured on 1 Dec.; Beyers was drowned on the 8th while trying to cross

the Vaal R. Attacks on Ger. E. Africa in 1914 met with serious reverses, and it was to take the Brit. forces 4 years to secure its final surrender (*see AFRICA, GERMAN EAST, FIRST WORLD WAR, CAMPAIGN IN; AFRICA, SOUTH-WEST; CAMEEROON*).

German Raids on British Coast. Two Ger. naval raids on the Eng. coast took place towards the end of 1914. On 3 Nov. Ger. cruisers made an abortive attack on Great Yarmouth, but on 16 Dec. Ger. battle-cruisers carried out a bigger raid on the NE. coast, evidently with the object of scaring the Brit. civilian pop. Scarborough, Whitby, and the Hartlepool were bombarded. On 24 Jan. 1915 Adm. von Hipper came out with battle-cruisers and light cruisers, probably with the object of luring the Brit. fleet on to

Christmas Day 1914, and the French carried out sev. air-raids on military objectives in Germany; but the Germans made use of air-raids over Britain principally to sow panic among the civil pop., and airships were the means generally employed, as they were capable of long cruises and of carrying a great weight of bombs.

ALLIES AND THE NEAR EAST. *British Attacks in the Persian Gulf and the Dardanelles.* The Brit. retort to Turkish attacks on the Suez Canal was made in the Persian Gulf and the Dardanelles. Good use was made of the Indian Army in an attack on the Turks at the head of the Persian Gulf. The Turks made little headway against the Brit. advance, and in April 1915 they suffered a heavy defeat with some 6000 casualties, with



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the mine-fields he had prepared off Heligoland, and an engagement took place near the Dogger Bank between the Ger. cruisers and Adm. Beatty's battle-cruisers. One Ger. cruiser, the *Blücher*, was sunk, and one Brit. cruiser, the *Lion*, was damaged; but the Ger. vessels, after a severe battering, escaped through their mine-field. The result of the engagement was indecisive, but it left no doubt about the command of the seas.

American Attitude towards British Blockade. During the spring of 1915 considerable resentment was aroused in America by the Brit. blockade of Ger. ports, which interfered with Amer. shipping, and there was criticism of America in England; but the situation was radically changed by the sinking of the *Lusitania*. It was on 7 May that this passenger liner was torpedoed off the S. coast of Ireland with the loss of 1100 people, many of them women and children and some of them Americans.

German Air-raids. During the winter and spring of 1914-15 air-raids began to play a part in the War. There was a Brit. seaplane raid on Cuxhaven on

the result that the Arabs became converted into allies of the British, and the way was now open for a Brit. advance on Bagdad. But successful operations in the Persian Gulf were of minor importance compared with the threat to the heart of the Turkish Empire involved in the Dardanelles expedition. Attack on the Dardanelles was the best defence of the Brit. position in Egypt; Allied success there would almost certainly bring in Rumania on the Allied side, with all the advantage of an extended line of attack, and might deter Bulgaria from hostile intervention and even induce her to join a Balkan alliance against the Turkish and Ger. power. Italy's position as a member of the Triple Alliance who had not yet taken up arms with her Allies was also an important consideration. During the winter and spring of 1915 prolonged diplomatic efforts were directed to the task of bringing in Italy on one side or the other.

Italian Diplomacy. Under the terms of the Triple Alliance, Austria and Italy had promised each other reciprocal compensation in case either was forced to

disturb the *status quo* in the Balkans. In Mar. 1915 Baron Burian finally accepted the principle that compensation was due to Italy, and the It. Gov. proceeded to extend its demands to include not only the whole of *Italia Irredenta*, but practically the whole NE. coast of the Adriatic. It was obvious that these claims could not be met by the Allies if they won the War, because they would involve concessions at the expense of the Serbs and of the other Slav races in Bosnia-Hercegovina (q.v.); but the value of her participation seemed to the Entente worth the risk of later difficulties, and on 26 April the treaty of London was concluded, which conceded to Italy most of her demands. But she still remained at peace with Germany for another year; and although she declared war on Austria on 22 May, she confined her efforts to attempts to secure the ter. at which she aimed. After some slight initial successes Italy did not seriously hamper the Austrian effort, and there were diplomatic difficulties arising from her intervention, particularly in Greece, which had serious consequences to the Entente Powers. King Constantine of Greece, married to the Ger. emperor's sister, and strongly pro-Ger. in his sympathies, was to prove a continual thorn in the side of the Entente, and he was unlikely to assist powers allied with Italy in view of Italy's claims to Gk ls. The Serbs showed their feeling against Italy when that country intervened on the Allied side, by making a dash for the Adriatic coast claimed by Italy (see also ADRIATIC QUESTION). In the meantime the Dardanelles expedition had suffered from divided counsels and was to prove a disastrous waste of men and material.

The Dardanelles and Gallipoli. The purely naval attack began on 19 Feb. 1915, and 3 successive squadrons of Brit. and Fr. ships were sent up the straits, only to meet Turkish floating mines and land torpedoes which were so effective that one Fr. battleship, the *Bouvet*, with most of her men, and two Brit. battleships, the *Irresistible* and *Ocean*, were sunk. On 25 April the second attempt to force the straits began, when an Anglo-Fr. force, including 2 Australian and New Zealand divs., under Gen. Sir Ian Hamilton, attempted landings. The result of this first attempt at landing was to give Hamilton possession of the extremity of the peninsula and of an exposed ridge of cliffs at Gaba Tepe, which was later named Anzac Cove; but he had failed in the hope of inflicting a surprise defeat on the Turks, and the struggle for Gallipoli resolved itself into a costly attack by inferior forces on land against almost impregnable positions. When a second attack was made on 6-8 May the naval guns of the supporting fleet failed to destroy the Turkish trenches, and an advance of 1000 yds was achieved only at the price of losses in men amounting by the end of May to more than the total Brit. losses in battle during the S. African War. A third attack on 4 June confirmed the impression that nothing short of a large

army could master the position. After further naval losses the naval attempt on the Dardanelles was gradually transformed into a land siege of the peninsula. (See also DARDANELLES and GALLIPOLI CAMPAIGN.)

THE EASTERN THEATRE OF WAR IN 1915. Mackensen's Galician Drive. During 1915 the centre of importance in the conflict shifted from the W. to the E. front. Germany saw that the enemy she could most easily defeat was not France but Russia, for Russia was badly equipped with munitions at the outset and had not the industrial organisation to make good the defect. Russia's vast Polish salient was a further weakness: it was protected by the Carpathians on the S., and the passes were extremely difficult for the transport of heavy artillery; but if once the Germans could make an advance in Galicia the Carpathians would be useless and the Russian armies in Poland exposed. Mackensen began his advance on 28 April with an attack on Dmitriev's left at Görlitz (Zgorzecko), so that the Russian gen. was compelled to weaken his centre along the Biala in front of Cieszkowice. Then on 1 May, the Germans began an overwhelming bombardment of the Russian positions. The Russian defences were completely destroyed, and the Russians could make little reply, so that the Germans were able to cross the Biala and to capture Cieszkowice and Görlitz, and to break Dmitriev's line. On the 2nd Dmitriev was in full retreat to the R. Wisłoka, 20 m. in the rear, where no position had been prepared, and Mackensen forced his way across the riv. on the 7th and pushed on still farther. This advance compelled Brussilov's Army to retire hastily from the edge of the Carpathians, and in the retreat his losses were heavy. For the rest of the month Mackensen advanced irresistibly. By the 18th he had captured Koszów and seized the line of the San from Sienawa to Jarosław, and on 1 June Przemyśl was evacuated.

The Fall of Lemberg. At the battle of Rawa Ruska on 20 June Mackensen cut the Russian communications N. of Lemberg, and the cap. of Galicia once more fell into Austrian possession on the 22nd. After the fall of Lemberg the Russians lost the line of the Dniester as far as Halicz (q.v.) and the country beyond it, including the Bukovina (q.v.). They fell back on the Gnilla Lipa, where Ivanov offered a prolonged resistance. But the Ger. advance had achieved all its objects except the complete defeat of the remnant of the Russian armies in Galicia, and their front was now swung round to face N., where the Russian armies in Poland were outflanked. A corresponding advance had been made by von Bülow on the N. of the great Polish salient. Libau had fallen on 9 May, and during that and the following month the Germans occupied the duchy of Courland as far as Windau on the coast and Shavli, half-way to Riga.

German Offensive in Poland. The Germans planned to outflank the Russian

position in Poland by striking at Vilna from the N., with a naval attack on Riga as part of the campaign. Mackensen's Galician armies had first to face N. so as to take their part in Hindenburg's general plan by driving back the Russians across the railway between Lublin and Kovel. Only a few days after the capture of Lemberg these armies proceeded to carry out this turning movement. They were joined on 16 July by von Gallitz, with a movement on the extreme N. of Poland, and on the 30th the Germans captured Lublin and Cholm. The fall of Warsaw could now no longer be avoided. On 4 Aug. the Russians abandoned the lines at Blonie and marched through the city, blowing up the bridges over the Vistula as they went. Next day Prince Leopold made his entry.

Russian Bureaucratic Incompetence. The incompetence and corruption of Russian bureaucracy was beginning to have even more serious effects than the loss of Poland. The shortage of munitions was so great that the artillery of one army was limited to 2 shells a day, while one whole division had on one occasion to face an attack without a single rifle. The withdrawal from Warsaw was the first step in the Grand Duke Nicholas's projected retirement from the whole Polish salient, and he hoped that his flanks would hold out long enough to enable the main retreat to be effected safely. He left a strong garrison at Novo Georgievsk to hamper the Germans; but the most dangerous point was on the line of the Narev, where von Bülow was about to attack the fortresses. On 10 Aug. Lomza was captured, and on the day that Warsaw was taken the bombardment of the most important of the Narev fortresses, Kovno, began. Kovno was the angle of the Russian base, and the loss of it would also make it easier for von Bülow to complete his wheeling movement by way of Vilna so as to threaten the Russian communications. Kovno fell unexpectedly soon, on the 17th.

The Russian Retreat—German Blow at Vilna. After Kovno other fortresses fell rapidly: Novo Georgievsk on the 19th, Ossowiec on the 23rd, and Brest-Litovsk, the centre of the Russian base-line in Poland, on the 26th. On the same day Augustovo (q.v.) was evacuated and Bialystok (q.v.) captured. On 2 Sept. the Russians abandoned Grodno, leaving the whole line from Brest-Litovsk to Kovno in the hands of the Germans. The Russians were driven back into the Pripet Marshes, which were at their driest at this season, so that they presented few obstacles to the advance eastwards of Mackensen from Brest-Litovsk, with the result that he quickly reached Pinsk on the railway to Moscow. In Galicia Ivanov was driven back to the Sereth, and in the far N. von Bülow was advancing on Mitau and Riga, thus threatening the Vilna-Petrograd railway and forcing the Russians to continue their retreat along narrow lines of communication which would inevitably become congested. The main Ger. effort was now directed towards

Vilna. On the 13th the Russians began to evacuate Vilna, and by the 17th reinforcements of Ger. cavalry had travelled as far as Vileika, nearly 70 m. E. of Vilna, and were threatening the Russians retreating from that city. At this critical moment Ruzsky was restored to command of the N. Russian armies and succeeded in relieving the position, and in gradually straightening the lines so that they ran nearly due S. from Dvinak by Postavy, Lake Narotch, and Smorgon. In the S. the Ger. forces were also driven back. On 7 Sept. Ivanov counter-attacked Mackensen's advancing forces from Rovno, and Brussilov and Lechitzky counter-attacked on the Sereth.

WESTERN FRONT, 1915. Allies' Spring Offensive. In the W. the old idea that separate attacks would defeat the Germans still persisted, and there was no effective co-operation between the attacks at different points along the front. The Fr. offensive began in the Woëvre, while the British began at Neuve Chapelle, a vil. at the foot of the Aubers ridge. There was a Ger. salient there, and if the ridge could be carried it would threaten the Ger. hold on Lille, and might cut off La Bassée and straighten the line. The attack began on 10 Mar. with a concentrated effective artillery bombardment. On the Brit. centre and right the 4th Corps and the Indian Corps were enabled by this preparation to advance beyond Neuve Chapelle as far as the slopes of the Aubers ridge; but the total gain to the Allies was only a vil. and a strip of land 3 m. by 1. (See NEUVE CHAPELLE.) The French, however, were rather more fortunate, but their successes in the Woëvre and Alsace were local and were of no greater value than the Brit. to the general plan of campaign. Early in April they gained the plateau of Les Éparges and advanced towards Etain on the road from Verdun to Metz, while they made some progress between St Mihiel and Pont-à-Mousson. In Alsace they took Sondernach and advanced during April towards Metzeral and Münster, and recovered the summit of the Hartmannswellerkopf. The failure of the Russian offensive at this time made it essential to try some plan which would prevent the Germans sending more troops from the W. to the E., and the point chosen for the Allied activities was Lille, a great railway centre and important as protecting both the right of the Ger. line along the Aisne and the left on the Belgian coast.

German Gas Attacks. The Germans, however, anticipated this move and began a counter-offensive against Ypres which was probably not intended as a major operation, but gave them the opportunity to try the use of chlorine gas on the evening of 22 April. This proved a formidable surprise to the Fr., Brit., and Canadian troops along the Yser Canal. The gas attack N.E. of Ypres coincided with an attack on Hill 60 (q.v.) at the S.E., which resulted in some of the fiercest fighting of the whole war. By the 23rd the Germans had crossed the canal at Het Sas and Lizerne, and the Canadians

were fighting on 3 fronts between St Julien and Garfenstafel. On the 24th the Germans made another gas attack and St Julien was abandoned. But reinforcements were on the way, and Fr. regulars recaptured Lizerne and Het Sas and secured the W. bank of the canal against a further Ger. advance; while, on the 29th, the Canadians, who had saved the position at considerable loss, were relieved by Brit. troops. Fighting continued for a considerable time longer, and it became necessary to shorten the Allied line, an operation which was safely effected on 3 and 4 May. Heavy bombardments continued until the 24th, when a final gas attack by the Germans concluded the main effect. Crude respirators had by this time been served out, and the gas did less damage than on the earlier occasions. The Ger. offensive around Ypres now slackened to meet Allied attacks beginning on the Ger. positions in front of Lens and Lille. To protect Lens the Germans had constructed massive fortifications at the foot of the SW. slope of the Vimy Ridge, which ran in front of Lens. These fortifications were known as the Labyrinth and the White Work. The French had collected 1100 guns and an immense supply of munitions for the most concentrated bombardment so far made. The bombardment was successful in clearing the way for the infantry, who captured La Targette and the White Work and entered Neuville St Vaast. Not until the 12th did they capture the summit of Notre Dame, and another fortnight elapsed before they secured the Souchez sugar refinery, while the Labyrinth still held out, and for 2 years more Vimy Ridge remained in Ger. hands. The Ger. lines had been broken, but once more the lesson was driven home that small local successes were of little value when the main line was still held.

Coalition Government formed in Great Britain. An outcry over the lack of munitions now led to the reconstruction of Asquith's gov., with Lloyd George as minister of munitions, and at the same time Lord Fisher (q.v.) resigned from the Admiralty. He had been at loggerheads with Winston Churchill over the Dardanelles expedition, and, on his resignation, Asquith formed a coalition gov. in which were included the principal Conservative leaders, and one or two Labour leaders. Churchill left the Admiralty, and Lord Haldane (q.v.) was removed from the post of lord chancellor. By the autumn of 1915 the relative strengths of the Germans and Allies on the W. Front had become much less unfavourable to the Allies, largely on account of the withdrawal of Ger. troops to the E.; while the Allies had secured a still more marked superiority in guns and munitions.

Western Front in the Autumn of 1915. It was this superiority which encouraged the Allies to undertake renewed offensives in Sept. The British had taken over some 30 m. of what had been the Fr. front, and had now 1,000,000 men in the field, while the Fr. had 2,000,000. But the Brit. front was not continuous. Plumer's

Second and Haig's First armies held the line from Ypres to the S. of La Bassée, but d'Urbal's Tenth Fr. Army intervened between Haig and the new Third Brit. Army stretching from Arras to the Somme. On the Brit. front a secondary attack was planned, but the main attack was to take place in Champagne, with the intention of breaking the Ger. communications from E. to W. along the Aisne. (See AISNE, BATTLES OF THE.) The French took most of the Ger. front-line trenches and some of their second line, capturing thousands of prisoners and scores of guns. They captured the Butte de Tahure, commanding the Bazancourt-Challange railway, which it had been hoped to break; but on 30 Oct. the Germans recaptured this position, and the French were left with the doubtful net advantage of an advance, at some points, of 2½ m., having inflicted, however, greater losses on the Germans than they had themselves suffered. The attacks between Ypres and Arras produced approximately similar results. The battle of Loos (q.v.) was the prin. Brit. effort. The British took and held Loos, but failed in their major object of securing Lens. The defect was partly due to the delay in the advance of d'Urbal's Fr. Army, which failed to make headway until the 26th, when they took Souchez together with most of Givenchy Wood and Thélus. On the 28th they made some progress up the slopes of the Vimy Ridge. Attacks and counter-attacks during Oct. led to little result, and the line was gradually stabilised for the winter with but small changes to compensate for the cost of the great Allied offensive. In Dec. Sir John French was recalled. A brilliant cavalry leader, he was not the ideal commander-in-chief for a war of attrition.

THE NEAR EAST, 1915-16. Gallipoli and the Dardanelles. During June 1915 heavy Turkish attacks with fresh troops were repulsed; but Sir Ian Hamilton could do no more than hold grimly the positions already occupied until the end of July, when reinforcements arrived. In July a new type of monitor had been evolved with little exposure to submarine attack, and capable of throwing heavy shells 12 m. These were to take their share in the naval part of the new plan which had been decided on. This plan involved 4 separate actions. A feint was to be made at the head of the Gulf of Saros, as if to take in flank and rear the Turkish lines crossing the neck of the peninsula at Bulair. Next, a strong offensive was to be resumed by the troops in the Cape Helles region against their old objective, Achi Baba. It was hoped that these 2 movements would lead the Turks to send their reserves to Krithia, in front of Achi Baba in the toe of the peninsula. Meanwhile the Anzac Corps were to advance and to attempt to gain the heights of Koja Chemen; while to the left a great new landing was to be made at Suvla Bay, just at the angle of the Gulf of Saros with the Aegean. The preliminaries to the main assault began when the Allied forces at

Cape Helles on 6 Aug. made a general attack on Achi Baba. For the next 3 days fighting continued, principally in the centre. This engagement was intended to distract the Turks, and as such it may be considered to have succeeded. The operations undertaken by the Anzac Corps developed into the most desperate struggle which had so far taken place in Gallipoli. The Australians began the attack against the Lone Pine Plateau in the afternoon of the 6th, and before night the whole Lone Pine position had been won. For the next few days the Australians had to fight to maintain their ground, and in this action alone the Turkish losses were estimated at 5000 men. Meantime the Anzac left wing began to move during the night of the 6th, and the preparatory movements were tolerably successful. The principal operation began at dawn on the 7th. At first the New Zealanders made good progress and carried Rhododendron Ridge to the W. of Sari Bair; but the Indian and Australian troops on their left were held up in the difficult country. At dawn on the 8th the New Zealanders again attacked and carried the crest of Chunuk Bair from which they could just see the Dardanelles. On the 10th the Turks counter-attacked on Chunuk Bair and drove the Brit. forces some distance from the ridge, but were held there. The landing at Suvla Bay had taken place on the 7th with the support of monitors in the bay, but little advance was made, and by the 9th it was too late, for the Turks had already moved reinforcements to the area. For the next 10 days no further advance took place, and the British prepared for a new landing at Suvla, for which the 29th Div. was transported in trawlers from Cape Helles. The attack began on the 21st, but it failed. The Aug. fighting was the most costly part of the Dardanelles campaign. For the first 3 weeks of the month the Brit. casualties were approximately 40,000, and the sole result was to extend the length of the Brit. battle-front by 6 m. and to advance it on the left by a m. or two. After the end of Aug. the 2 exhausted armies abandoned further hope of advance. (See GALLIPLI CAMPAIGN.)

Allied Diplomacy and the Balkan States. During the spring and summer Allied diplomacy had been concentrating on the complicated problem presented by the Balkan States. Ferdinand, King of Bulgaria, demanded as the price of Bulgaria's assistance to either side the return to her of her ter. which had been seized by the other Balkan states. As the Allies could satisfy Bulgarian demands only at the expense of the Serbs, who were already their allies, and the Rumanians and Greeks, whom they hoped to make their allies, their promises were but half-hearted. Germany, however, offered Bulgaria Serbian Macedonia, Salonika, and also the Gk Epirus. This

offer was finally embodied in a secret treaty signed on 17 July 1915 between Bulgaria, Germany, Austria, and Turkey. The Germans now undertook a campaign to secure the Balkans and bring in the waverers on their side. Bulgaria being now secretly committed to them, they could hope to control the railway to Constantinople by a successful Balkan campaign, and so bring much needed munitions to Turkey and food and other supplies to Germany. Ger. diplomacy appreciated, too, that Brit. fears for India and Egypt would be increased by a Ger. success in the Balkans, and that these fears might induce the British to divert to the Balkans troops needed on the W. front. Mackensen, the victor in Galicia, was selected to lead the Balkan campaign, and during Aug. the concentration of troops began. On 19 Sept. Mackensen's combined Ger. and Austrian forces opened fire on Belgrade. At first he made little progress. The Entente continued up to the last possible moment to play for Bulgarian neutrality, and even refused to allow Serbia to undertake an aggressive movement against Bulgaria which might have altered the course of events. Venizelos (q.v.), the Gk Prime Minister, was not deceived, and on 21 Sept., after the Ger. attack on Serbia had begun, he asked France and Britain to send 150,000 troops to Salonika.

Allied Expedition to Salonika and German Invasion of Serbia. That day the first steps for Bulgaria's mobilisation were taken, although the official order was dated 2 days later. On the 24th France and Britain agreed to Venizelos' request to send a force to Salonika, and on the same day Greece began to mobilise. On the 25th news came that Bulgarian cavalry was massing on the Serbian frontier. Rumania, already mobilised, announced that she would as yet take no decisive step. On 28 Sept. Venizelos secured the support of the Opposition in the Gk Parliament to his War Credits Bill, and on 5 Oct. Russia broke off relations with Bulgaria, to be followed by Britain and France. Meanwhile the Allied troops were arriving at Salonika. On 4 Oct. Venizelos had announced that Greece must go to war without waiting for a formal declaration by the Central Powers; but the next morning King Constantine told him that his policy had not the royal sanction, and he resigned. Zaimis became Premier, and announced that Greece would retain an armed neutrality benevolent towards the Entente. Mackensen now moved swiftly. On 9 Oct. Belgrade was captured. On the 11th Bulgarian troops crossed the Serbian frontier, and on the 12th Bulgaria declared war on Serbia. On the 15th Britain declared war on Bulgaria. The Allies had only some 13,000 troops at Salonika, and there was no hope of Rumania coming in on the Allied side unless Russia could make a diversion in Bessarabia. The troops at Salonika could hope to do little more than harass the flank of the Bulgarian advance into Syria. Serbia faced the new invasion with an army reduced by

*A map of Gallipoli and the Dardanelles is printed in the article
GALLIPLI CAMPAIGN*

the losses of 1914 to not more than 200,000. Her internal condition was completely disorganised by repeated invasions, but if Mackensen had been the only enemy, they could have hoped to retire again to the hills and keep in touch with the Allied base at Salonika. The intervention of Bulgaria on the E. flank completely altered the situation. The only hope for Serbia was that the Allies at Salonika might be able to turn the Bulgarian flank (see under SERBIA); but the Allies were unable to advance, and the Serbians had to fall back after a week to the Albanian borders. Gen. Sarrail, with the Fr. force which had landed first at Salonika, advanced up the railway line towards Mitrovitza as far as Krivolak, while the British were on the Fr. right towards Lake Doiran. The French succeeded in crossing the Vardar R. and occupying the heights opposite Krivolak, but were compelled to fall back from an advanced position across the Tchernia into an entrenched camp they had prepared around Kavadar. The Allies had failed to bring help to Serbia while involving their own forces in extreme difficulty. After the capture of Nish, Mackensen, having secured the route to Constantinople, left the advance mainly to the Bulgarians, on whom he relied to complete the rout of the Serbian remnants who were now struggling through the passes to the Albanian coast. By 12 Dec. the Allies had withdrawn within the Gk frontier, without serious losses, and took up a strong position about 30 m. from Salonika. Although the purpose of the Salonika landing had failed, the Allies were determined to hold it, because it would have made a formidable base if occupied by the Central Powers. Accordingly, steps were taken to fortify the lines across the whole peninsula of Chalcidice. The Austrians had now undertaken the conquest of the little kingdom of Montenegro. On 13 Jan. they entered Cetinje, the cap., and announced the unconditional surrender of Montenegro, but it was soon found that there had been no surrender and that the Montenegrin Army was retreating towards Scutari, while King Nicholas of Montenegro had fled to France. On 23 Jan. the Austrians occupied Scutari, and moved S. against an It. force at Durazzo, which they captured on 27 Feb., and the loss to the Allies of this port made it necessary to find some base for reftment inaccessible to the enemy. Fr. and It. troops were landed at Corfu, and the Serbian Army, evacuated from Durazzo, was able to use it as a rest camp.

Evacuation of Gallipoli and its repercussion in Mesopotamia. Meanwhile the Gallipoli campaign (q.v.) had come to a standstill. The heavy losses during the 7 months of the expedition, coupled with the doubt whether supplies by sea could be maintained in the winter storms, decided the Allies to undertake the difficult task of evacuating Gallipoli. The final embarkations from Suvla and Anzac took place on the nights of 18 and 19 Dec., and early on the morning of the 29th the

last troops from these areas began to embark. The evacuation of Cape Helles was still more difficult, and had to be delayed; but the last troops were evacuated 8 Jan.

Their preoccupation with Gallipoli ended, the Turks were now free to turn their attention to other areas, one of which was Mesopotamia. A force from India had captured Basra at the junction of the Tigris and Euphrates in Nov. 1914. Early in Dec. the Turks collected troops at E. Qurnah, 50 m. up the Tigris at the junction with the old channel of the Euphrates, but a Brit. force obtained the surrender of the Turkish garrison on 9 Dec. The British had now obtained control of the whole of the delta and prepared entrenched camps on either side of the Tigris, at El Qurnah and Mezera, to secure their position. At the beginning of 1915 further reinforcements were brought from India under Sir John Nixon, who took supreme command of the operations. During April the Turks attacked the Brit. positions in force, but were beaten off with heavy loss. Towards the end of May they attacked again, and it was decided to drive them N. The important military post of Amara, 75 m. N. of El Qurnah, was captured on 3 June, and the Brit. advance continued in spite of a desire to limit the operations, largely because each advance made necessary some further operation to secure the position reached. Thus the Brit. hold on Amara was precarious so long as they did not hold Nasiriyeh on the Euphrates. A Brit. force from El Qurnah captured Nasiriyeh on 25 July, with large stores of ammunition. By this time the larger project of an attack on Bagdad itself was being developed, and an advance to Kut al Amara (q.v.) was decided upon. By the 29th the Turks were in retreat towards Bagdad and the British, under the command of Maj.-Gen. Townshend (q.v.), entered Kut. By the end of Sept. Townshend was only some 200 m. by riv. and 100 m. by land from Bagdad, with easy country before him and the winter climate, which was favourable to campaigning. But he had little more than a div., he was well over 300 m. from his base on the sea, and had a difficult riv. full of shoals and banks as his sole means of communications. Townshend protested against the advance, but was overruled. On 22 Nov. the Brit. troops reached the Turkish prepared position in Ctesiphon. The battle continued until the 24th, but the inadequate forces of the British could not pierce the strong Turkish positions. Accordingly, at midnight on the 25th the British began their retreat. On 3 Dec. the remnant of the Brit. force reached Kut al Amara, and the historic 5-month-long siege of that tn. began. Four Turkish divs. lay around the tn. and on the 7th the Turkish commander, Nured-Din, called upon the garrison to surrender. On Townshend's refusal, he opened a heavy bombardment. Relief forces failed to make headway through the floods, and on 29 April Gen. Townshend surrendered.

The Russian Campaign in the Caucasus. The Grand Duke Nicholas, who commanded in the Caucasus, had been preparing for an offensive for some time. The immediate commander of the attacking forces, Gen. Yudenitch, began his advance on a wide front to avoid having his flank turned by the considerable Turkish forces which stretched northwards from Lake Van to the Black Sea. He planned to attack Erzerum by 3 columns converging on the city. The preparations for the advance were entirely unknown to the Turks, and on 11 Jan. Yudenitch's right wing drove back the enemy upon Lake Tortum, and then moved over the mt passes and encircled the Turkish left, so that it was compelled to fall back towards Erzerum to avoid being cut off. His left followed similar tactics, and the centre made good progress to the vil. of Kuprikeui, which commands the bridge over the R. Araxes. Here a fierce battle took place from 16 to 18 Jan., when the Russians forced the bridge in a snowstorm and took the vil., driving the Turks back on the road to Erzerum. On 19 Jan. Yudenitch reached the strong Turkish position of Hassan Kaleh, which it was believed would be held in force; but the Turks had suffered so severely at Kuprikeui that they fought only a rearguard action, and again retreated behind the Deve Boyun hills, which formed the immediate defence of Erzerum on the E. On 10 Feb. the right column, coming down the valley of the W. Euphrates through deep snow and some 50° of frost, reached the fort of Kara Gubek, at the extreme N.E. point of the defences of Erzerum. This fort fell on the 12th, and next day the Russians carried Fort Tafta, some 5 m. farther along the valley, which gave them a position in the rear of the main defences on Deve Boyun, which they continued to attack frontally. Meanwhile the S. Russian column was forcing its way through the passes of the Palantuken range to the S.E. of the city, and by the evening of the 15th they had carried the position, and on the 16th entered Erzerum. In the whole of the Russian advance some 5 Turkish divs. were completely destroyed. But the capture of Erzerum itself was not of great value without that of Trebizond and of Erzingan, which stood at the opening into the rich plain of Anatolia, from which Turkey drew her main supplies of food. The Turkish troops released from Gallipoli were coming up before Yudenitch could advance much farther, and it was necessary to continue the advance with some caution. On the morning of 18 Mar., Trebizond fell, the garrison retreating southward in the direction of Balburt. On 25 July Russian cavalry occupied Erzingan. Further advance was delayed for a time by Turkish attacks, but by 25 Aug. Yudenitch had broken these and was once again free to resume his slow progress towards Anatolia. (See also under CAUCASUS.)

The Arab Revolt. Meanwhile in Persia during the spring and summer the Russians had been conducting a campaign

with a small force under Gen. Baratov, which had been sent in Dec. 1915 to counteract the effects of Ger. propaganda there. The Persian gendarmerie under Swedish officers had been encouraged by Prince Reuss, the Ger. minister to Teheran, to rebel against the pro-Entente gov. Prince Reuss collected a total force of some 15,000 and endeavoured to hold certain important points at Kum, a telegraph junction on the road to Ispahan, and at Hamadan on the Bagdad road. Swiftly the Russians attacked these positions and drove the rebels to the hills on the border of Mesopotamia, where they kept in touch with the Turkish Army. In Mar. Sir Percy Sykes arrived at Bunder Abbas and proceeded to organise a military police for S. Persia. Baratov continued to advance and reached the frontier of Mesopotamia in May; but in June Turkish reinforcements attacked him and drove him back finally even from Hamadan, while sporadic revolts began in Persia. Meanwhile, the revolt of the Arabs in the Hejaz (q.v.) considerably upset Turkish calculations. On 9 June 1916 the Sherif of Mecca proclaimed Arab independence of Turkey and occupied Mecca and the port of Jeddah, capturing the Turkish garrisons, and laid siege to Medina, and, later, cut parts of the Hejaz railway to prevent the Turks sending reinforcements from the N. The revolt spread rapidly. The Said Idrissi of Asir took the Red Sea port of Kufidah. On 27 July Yambo, the port of Medina, was captured, while the revolt spread northwards as far as Damascus. The revolt in the Hejaz delayed the development of the Turk's projected attack on Egypt; but in Aug. they advanced with a force of some 18,000 men towards the Suez Canal from the E. The Brit. forces were drawn up near Romani, about 23 m. E. of the canal. The Turks attacked on 3 Aug., and the fighting lasted throughout the 4th. The Brit. cavalry slowly withdrew, entangling the Turks in the sand dunes, and in the afternoon Brit. reinforcements came up, and the Brit. counter-attack completely routed the Turks, who were pursued until the 9th, when they attempted a stand, but were again routed. It was a decisive defeat, which secured Egypt from further attack.

The Policy of King Constantine. Meanwhile the situation of the Allied troops at Salonika had been considerably affected by the mutations of Gk policy. After the fall of Venizelos in Oct. 1915 a temporising policy under the king's influence was adopted by the bureaucracy which carried on the gov. The Allies' retort was to proclaim a restriction of supplies of coal to Greece and to Gk ships in Allied ports, with the object of preventing supplies reaching the enemy. The front at Salonika was now held by the British on the right, the French in the centre, and the reconstituted Serbian Army on the left. An Allied offensive was planned for Aug., partly in the hope of taking Monastir, which had great political importance as one of the main objectives of the Bulgarian war policy, while a

further motive for the offensive was to be found in the attitude of Rumania, which was already committed in secret to the Entente. If the Allies could hold a large Bulgarian force on the Salonika front they would prevent Bulgaria attacking the Rumanian flank. Early in Aug. Gen. Sarrail was put in command of the whole of the Allied forces on the Salonika front. On 10 Aug. the French began to bombard the town of Doiran, close to the junction of the Gk., Bulgarian, and Serbian frontiers. On the 11th they occupied Doiran station and a height to the S. of the town, and carried Doidjeli; but on 17 Aug. the Bulgarians began a counter-offensive. Their principal advance took place beyond the extreme right of the Allied line on Kavalla, which neighbourhood was held only by Gk. troops, who were without instructions.

Rumania's Entry into the War. With the Russian advance in the Bukovina in June 1916 (which will be considered in another section) and the Allied advance in the W., the position seemed favourable for Rumania to enter the war on the Allied side. On 27 Aug. Rumania declared war on Austria. She hoped to limit her participation to war with Austria, but the Allies recognised that this would be impossible, and on 28 Aug. Germany declared war on Rumania. On 1 Sept. Bulgaria also declared war. Rumania brought an addition to the Allied sources of some 500,000 men, but her value to the Allies was lessened by the fact that her main purpose in entering the war was to secure Transylvania.

Rumania's Campaign in Transylvania. Rumania's first step was to invade Transylvania on 28 Aug. at numerous points. She gambled on the help of the Russian campaign in the Carpathians to distract the Austrian effort against her, and also on the advance of Sarrail from Salonika to distract the Bulgarians from her S. frontier. At first all went well with the Rumanians, and within a fortnight of the declaration of war all the passes, the strategic frontier railway, and most of the frontier towns had been occupied, and the Magyar people of SE. Transylvania were in full flight. But the appearance of success was deceptive. The Rumanian forces were widely scattered, while the Austrians had fallen back on a shorter and safer line, and behind this line the Germans were making preparations for a counter-attack on a scale entirely unsuspected by the Rumanians. Von Falkenhayn, formerly chief of the Ger. staff, had been sent to Austria to command the new Austrian Ninth Army, which was being prepared for driving back the Rumanian left wing into the Wallachian plains, and farther S., von Mackensen was collecting another army which was to operate S. of the Danube and in the Dobruja. The 2 armies were to converge on Bucharest.

Mackensen's Campaign in Rumania. Mackensen advanced first into the Dobruja, and on 6 Sept. captured Turtukai (important as commanding the ferry across the Danube to Oltenitz on the road to Bucharest), with 100 guns and

the whole of an infantry division. On the 9th Bulgarian troops, occupied Sillistria. By the second week in Oct. the Rumanian Army was in full retreat, and von Falkenhayn's pressure was increasing. In the early autumn of 1916 the position of the Entente in the Near E. was not good, while Ger. plans in that area were nearer to realisation than they had been at any earlier period of the War. Ger. communication with Constantinople had been securely established, with the double result of securing supplies of food for Germany from Turkey and supplies of munitions for Turkey from Germany, as well as stiffening the Turkish resistance. Russia was reaching the end of her resources.

THE WESTERN FRONT IN 1916. Résumé of the General Position at the Beginning of 1916. On the W. front, having obtained for her own use the great industrial areas of Belgium and N. France, Germany was accelerating output at the highest pressure, while successfully holding the front with fewer troops than the Allies required to oppose her. In other areas Ger. successes, as shown above, had been immense. Not only was she producing munitions of war in overwhelming quantities, but the whole of her industrial life down to the smallest detail was mobilised for war. Being in a dominant position in relation to her allies, she had no need to fear the disagreements that commonly arise among equals, while she entertained the hope of advantage from possible differences among the Entente Powers. Britain was the most dangerous of her enemies on account of her wealth and her potential manpower; but there were signs that Britain was wasting her resources, and that her ministers had not yet grasped the needs of modern warfare.

The Munitions Act in Great Britain. With the reconstruction of the Asquith ministry as a coalition in 1915, a Munitions Act was passed providing for gov. ownership in full control of munition factories so as to secure rapid production, even at the price of greatly enhanced wages.

The Recruiting Problem in Britain. Meanwhile, in the later months of 1915, the recruiting problem in Great Britain had caused anxiety. There was a growing opinion that the voluntary system operated both wastefully and inequitably. In Aug. 1915 a national register had been taken, which provided information of the man-power available, and it was obvious that some form of compulsory service would soon become necessary unless the rate of voluntary enlistment could be increased. In this emergency the Earl of Derby (q.v.) was appointed director of recruiting. The main proposals of what was known as the 'Derby Scheme' were that men were to be recruited in 46 groups, according to age, the married men filling the last 23 groups. These groups were to be called to the colours as occasion demanded. On 4 Jan. 1916 Lord Derby issued his report. It was then estimated that the total of men available for service would not be more than 830,000. On 5 Jan. Asquith introduced

a Military Service Bill in the House of Commons, and the Bill passed rapidly through all stages in the House of Commons with a very small minority in opposition. (See CONSCRIPTION.)

The German Attack on Verdun. With the object of a final reckoning with the still undefeated Fr. armies, the Germans now prepared a new plan, of which Verdun (see VERDUN, BATTLE OF), the great fortress on the right of the Fr. line, was the objective. The Ger. plan was to attack at advantageous points all along the front so that the Allies would not know whether the attacks were feints or the beginning of a general offensive; and while their enemies were thus fully occupied the Germans would be able to concentrate men and guns behind Verdun. Once the line was pierced there, fresh troops would be available for a final advance on Paris, which should end the war. On the morning of 21 Feb. a short, intense bombardment began. It was by far the fiercest bombardment yet experienced. It completely obliterated the first Fr. lines, broke up the communication trenches, and altered even the shapes of the hills. Close upon it the Ger. infantry moved forward to the attack, some 14 divs. against the 3 Fr. territorial divs. who were holding the 7 m. of centre between Brabant and Herbebois. The French fell back to their second line from which they could make a counter-attack under the fire of their 75s. A counter-attack regained some ground, but on Tuesday, the 22nd, a new bombardment was begun by the Germans, followed by fresh infantry assaults. The French began a general retreat to prepared positions on the highest parts of the plateau, stretching from Vacherauville on the Meuse, along the Côte du Poivre (Pepper Hill), and S. to the gorge of Vaux at the edge of the hills. This position was the last defensive line covering Verdun. In a heavy snowfall on the Friday morning the Germans began their new attack. On the evening of the 25th the Fr. front was pierced in the neighbourhood of the ruins of the old fort of Douaumont. But the victory was destined to be barren. At this juncture the defence was entrusted to Gen. Pétain (q.v.). He stabilised the line and drove the Germans from their position at Douaumont. The Ger. high command now realised that their frontal attack had failed. They therefore reverted to their more usual method when attacking a salient of trying to drive in the 2 flanks.

The second phase of the battle of Verdun began with an attack from the NW. on 2 Mar., and the French fell back behind the Goose's Crest. On the 8th the Germans transferred their main effort to the front at Vaux, but it failed. On the 10th the Germans, heavily reinforced, again attacked; but the Fr. guns prevented them from coming to close quarters. On the 11th the Germans made their supreme effort. The result of this attack on the W. bank of the Meuse was to win a triangle less than a m. deep between the Forges stream and the Béthincourt-Cumières road.

The key to the position, Mort Homme, was still in Fr. hands. On the E. bank the Germans had secured most of the Bois d'Hardaumont; but they had made no progress towards the definitive capture of Douaumont. They now prepared a flank attack from the W.

On Friday the 16th the third phase of the battle commenced, when Ger. guns opened a bombardment of the lines between Avocourt and Béthincourt, and on the 20th the first attack was made on the line between Avocourt and Malancourt, and by evening the Germans were on the edge of the hill slopes towards Mort Homme. On the 28th they attacked Malancourt with innumerable waves of troops. But Pétain successfully counter-attacked and withdrew his troops from Haucourt to a position on the slopes of the hills. Fierce fighting continued until 11 April; but the Germans failed to achieve any considerable success, and by the Tuesday it was clear that their main purpose had again failed. They had used some 9 divs. in the attack, and had again suffered the heaviest casualties, out of all proportion to the Fr. losses, while they had secured not a single Fr. key position. Sporadic attacks continued; but the main plan was now abandoned.

Between 3 May and 30 June the second battle for Verdun was fought. It resulted in no permanent advantage for the Germans, who again sustained heavy losses. With the opening of the battle of the Somme, the attack on Verdun lost its vital importance, and the battle gradually relapsed into sporadic engagements.

THE ITALIAN FRONT IN 1916. Austrian Trentino Offensive. Throughout the winter of 1915-16 the Austrians had gradually been strengthening one section of the Trentino front between the Val Lagarina and the Val Sugana. In these valleys accordingly the Italians had made good defensive positions. A great bombardment began on 14 May, when over 2000 guns, of which some 800 were of heavy calibre, destroyed the lt. front line over a length of 30 m. In the centre, by 1 June, the Austrians had driven back the Italians from many points on the last ridge of hills between them and the plain, and by the 4th had reached a point only 18 m. from Vicenza. But at last Cadorna's new Fifth Army began to make its presence felt and the Austrian advance was stayed.

Italian Counter-offensive and Capture of Gorizia. On 24 June Cadorna began his counter-offensive, and between the Brenta R. and the Adige he won ground everywhere. (See ISONZO.) From 1 Aug. the lt. guns bombarded the whole front from opposite Monte Santo to the Adriatic. On the 4th the Italians feinted from Monfalcone, with the object of drawing Austrian reserves to this part of the line preparatory to the real attack on Monte San Michele. On 6 Aug. the lt. bombardment was resumed with great intensity in front of Gorizia; the Austrian front position was destroyed, and the lt. Third Army under the Duke of Aosta

began their advance. On the left the Italians carried Monte Sabotino by storm, and before dark, reached a line within 4 m. of the riv. On the right of this section the Italians stormed the strong position of Oslavia, and farther S. they advanced against Podgora. The It. centre operating against the San Michele positions had made equally substantial gains. The Austrians here again offered a desperate resistance; but slowly the Italians forced their way to the key points, and by Tuesday, the 8th, Cadorna held all the heights on the W. bank of the riv. and the key point of San Michele on the E. bank. On the morning of the 9th the main It. Army crossed the riv. and entered Gorizia, while the cavalry pressed E.

The Advance on Trieste. The It. offensive now entered on its second stage, which had for its objective the capture of the port of Trieste. The first move aimed at driving the Austrians from the Vailone. On 10 Aug. the advance began, and by the 12th the whole of the W. end of the Carso was in It. hands. Cadorna continued to press forward into the Carso and occupied the vil. of Oppacchiasella, the hill of Nad Logem, and positions on the W. side of Monte Pecinka. NE. of Gorizia, the Italians took Tivoli and thus estab. for themselves a footing on the slopes of Santa Caterina. The way was now clear for Italy to declare war on Germany, which she did on 28 Aug. 1916. No movement E. of Gorizia could be successful unless the ridge of Monte Santo were won and the Carso carried, and each was a formidable operation requiring for success full concentration of troops. The next movement was undertaken in the Carso, when on the morning of 14 Sept. a great bombardment began between the Vipacco and the sea, followed on the same day by an It. advance. There was desperate fighting round Nova Vas, but no decisive gains had been made by the 17th, and it was not until 10 Oct. that another attack was made. This was successful in straightening the front, and 5000 prisoners were taken. On the 12th the Italians carried the hill of Pecinka and reached the outskirts of the villa of Lokvica and Hudi Log. On the 13th in bad weather a further advance was made to the Gorizia-Prvacina road; but a succession of great gales dislocated the advance, and finally compelled the Italians to withdraw to a line a little behind Pecinka, Lokvica, and Hudi Log. For a fortnight heavy rains continued, and the first cold of winter began to be felt. On 30 Oct. an intense bombardment started, the greatest yet employed in the Carso, and on the morning of the 31st the Italians again advanced with considerable success. On a front of more than 2 m. between the N. edge of the Carso and the Oppacchiasella-Castagnavizza road the Austrian line was shattered, numerous batteries were captured together with 5000 prisoners; but the advance had created a considerable salient and on 2 Nov. the Austrian batteries shelled the new It. positions with appreciable effect. An infantry attack followed

on the next day, but it failed and the Italians again advanced, taking another hill and the crowning position on Fajti Hrib, which commanded the vil. of Castagnavizza and also the road across the plateau. Advance towards the S. was still blocked for the Italians by the formidable defensive system of Hermada, a great hill full of concealed batteries which covered the road to Trieste. To take this position meant a great concentration of guns, but meantime winter came on, and, although all through Dec. Cadorna waited for open weather, it did not come, and by Christmas he was compelled to postpone further advance until the spring.

THE RUSSIAN FRONT IN 1916. Russian Advance on Pripet-Pruth Line. By the beginning of Dec. the situation in the Balkans made it necessary for Russia to undertake some stroke which would divert a possible drive by the Central Powers into Bessarabia. Ivanov (q.v.) planned to attack Cernauti in order to cover the Rumanian border and began his advance on 24 Dec, but before he could attain his object heavy snow began to fall and the movement came to a standstill in the middle of Jan. It had, however, been useful to the Allies in bringing Mackensen N. to meet it and so reducing the pressure in the Balkans.

When it became clear that Italy might be overwhelmed if the Trentino attack succeeded, Russia arranged for a preliminary movement to relieve this pressure. On 3 June the Russians under Brusilov opened a bombardment along the whole front between the Pripet and the Pruth, and on the 4th the Russian advance began. By 6 June Gen. Kaledin (q.v.) was at the gates of Lutsk (q.v.), the H.Q. of the Austrian Army commander, and the Archduke Joseph Ferdinand was compelled to withdraw. By 16 June Kaledin had advanced some 50 m., had captured Lutsk (Luck) and Dubno, had reached the Galician frontier, and was within 25 m. of Kovel. But after this date, formidable Ger. and Austrian reinforcements began to arrive. Ludendorff himself was sent by Hindenburg to restore the position, and 4 Ger. divs. were rushed from France in as many days. Kovel was the danger-point, for its loss would cut communications between the Ger. Army of the centre and the Army of the S. Von Linsingen, who had been brought to the Volhynian front, opened his counter-offensive on 16 June, but he did not receive the reinforcements he expected owing to the Russians having attacked on the centre N. of Baranovitchi, a nodal point on the Ger. railway system between Vilna and Brest-Litovsk. Meanwhile, in the S., the Russians under Lechitsky had made another effective advance. On 17 June they entered Cernauti.

Austrian Retreat to the Carpathians. The Austrians were in full flight towards the Carpathians. By the 23rd the Russians had taken Kimpolung, the most S. tn in the prov., and the whole of the Bukovina was once more in their hands. Early in July the Russian Gen. Leech

carried out another effective advance which secured the right flank of the Volhynian salient, and took him to the banks of the Stokhod R. with 12,000 prisoners and 45 guns among his captures. Kovel was now only some 20 m. distant, but the intervening ground was difficult, and it was obvious that von Linsingen would employ every man he could to defend so important a position. Brusilov discovered von Linsingen's plans for a counter-offensive on the S. of the Russian salient, and anticipated it by sending Sakharov to advance towards Brody. He reached and took the town on 28 July, taking in this movement some 13,000 prisoners. But Sakharov did not rest, and by 10 Aug. he had completely turned the flank of the opposing troops. Meanwhile Lesch and Kaledin had made further attacks and won the whole line of the Stokhod R. Lechitsky in the S. also continued to make rapid progress, and, by the end of June, he had seized the important railway centre of Kolomea. Heavy rain delayed his further advance, but on 10 Aug. his right wing occupied Stanislav. The extraordinarily rapid series of Russian successes led to a complete reorganisation of the Central Powers' commands. Most of the Austrians were replaced by Germans.

IRISH REBELLION—BATTLE OF JUTLAND. *The Irish Rebellion.* What was potentially a great danger to the Brit. campaign was the Easter Rebellion of 1916 in Ireland. On the outbreak of the War the truce between the Ulster and Nationalist leaders had not been accepted by the wilder spirits in S. Ireland, and Germany had made unceasing efforts to stir up revolt among the more extreme Nationalists, and particularly among the members of the Sinn Féin (q.v.) organisation. Of these were formed the Irish Volunteers, whom the gov. at Dublin Castle did little to suppress. Sir Roger Casement (q.v.), had identified himself with this movement, and during the War went to Germany with the object of enlisting readily promised Ger. support for an armed rebellion, but the promises were never kept, and it is obvious that they had been made only in the hope of embarrassing Britain. An attempt to raise an Irish brigade from prisoners taken by the Germans failed miserably; Casement and 2 companions were landed on the Irish coast from a Ger. submarine. The Sinn Féiners failed to meet them, and Casement was arrested on Good Friday morning, the 21st, and taken to England. His capture upset the plans of the other rebel leaders; but it was decided that the rebellion must continue, and on Easter Monday, the 24th, the rebels seized St Stephen's Green, the law courts, the post office, and part of Sackville Street. Troops were brought from the Curragh, and reinforcements were sent from England. By 1 May the revolt had been crushed in Dublin and the local revolts were dying down. Fifteen of the leaders were tried by court-martial and shot. Casement was tried for high treason and executed.

Battle of Jutland. In the early morning of 31 May, the Ger. fleet put to sea, and the Brit. Grand Fleet set out to meet them. Chance brought the Ger. battle-cruisers under Adm. von Hipper into contact with Vice-Adm. Beatty's combined fleet of battle-cruisers and fast battleships at about 2.00 in the afternoon off the coast of Jutland, when Adm. Jellicoe, the Brit. commander-in-chief, with the main fleet, was scouting some distance to the N. At about 3.45 the action began at long range. In spite of his advantage in numbers, Beatty suffered the first and also the most serious losses in this part of the battle. The Ger. battleships under von Scheer appeared at about 4.30; and Beatty turned N. to join Jellicoe. Contact was made soon after 5.30, and Jellicoe's ships came into the fight soon after. Again, in spite of severe damage to the Ger. force, Brit. losses were the heavier. Soon after 7.0 p.m., the Ger. High Sea Fleet received orders to turn away individually, and by 8 o'clock the firing ceased with the complete disappearance of the Germans in the mist. Thus ended, inconclusively, the one great naval action of the war. In its ultimate effects the battle was more nearly a victory for the Allies, since it confined the Ger. fleet to port for many months for repairs. (See also JUTLAND, BATTLE OF.)

Death of Lord Kitchener. Soon after the battle of Jutland Lord Kitchener, who was on his way to Russia to confer on the coming Allied offensive, lost his life at sea. (See KITCHENER, VISCOUNT.)

THE WESTERN FRONT, JULY-NOVEMBER, 1916 *Sir Douglas Haig appointed British Commander-in-chief.* Meanwhile Germany maintained a conciliatory attitude towards the U.S.A., largely owing to the temporarily enhanced influence of Bethmann-Hollweg and his 'politicals.' On the W. front the British had taken over since the beginning of the year a considerable part of the line from the French, at the same time as Sir John French had been recalled and replaced by one of his former corps commanders, Sir Douglas Haig.

Allied Military Conference—Allied Economic Conference. The first general allied military conference took place in Paris in May, and there, for the first time in the War, was prepared a common plan of campaign. At an Allied economic conference in Paris in June it was resolved to co-ordinate the Allied economic systems, to prohibit their subjects from trading with the enemy directly or indirectly, and to prohibit the export to neutral countries of certain articles which might be re-exported to enemy countries. Further engagements were entered into for the period of reconstruction after the War, and certain permanent agreements for preferential treatment between the Allies were made, with a number of restrictions on the trading activities of enemy countries after the war.

The Battle of the Somme (1916). The plan for an offensive on the W. front involved a joint advance by British and

French, at the point on the Somme where their lines joined. The attack was to be made on a front of 25 m. from Gommecourt, half-way between Albert and Arras, to Fay, 5 m. N. of Chaules. The object of the offensive was to drive the Germans N. towards the coast, and so make it impossible for them to continue to hold the S. part of the great salient. But the Germans had not been idle during the winter, and they had made, in the Bapaume ridge, vast underground chambers, which no artillery could destroy, and these were to be mainly responsible for the failure of the Allied offensive to achieve its object. The battle of the Somme began on 1 July, after a preliminary bombardment since 24 June. The attack by the Brit. part of the line had been anticipated by the Germans, and in the N. part little progress was made; but farther S. Mametz and Montauban were taken on the first day. The French S. of the Somme made progress, reaching Biaches 1 m. from Péronne on the 9th. On 14 July the second stage of the battle opened with a Brit. attack from Contalmaison to Trônes Wood. A successful advance was made, the Germans being driven out of Bazentin-le-Grand and le-Petit and out of Trônes Wood. At the same time, a great advance was made to High Wood (Bois des Fourreaux) and the Germans were driven out of most of Longueval and Delville Wood; but much of this ground could not be held, and it took many days to secure sev. of the points reached on this day. The Australians captured Pozieres on 26 July. During Aug. the French improved their position N. of the riv. Sept. showed better results for the Allies. On the 3rd, in a general attack, Guillemont was carried, and the French carried by storm Le Forest, Cléry, and the Ger. lines up to the outskirts of Combles. On the 5th the British entered Leuze wood between Guillemont and Combles. The French continued to advance both N. and S. of the Somme, and on the 9th Ginchy was captured by the Irish regiments which had taken part in the capture of Guillemont. Thus at last the Allies were beginning to move; but it had taken over 2 months to secure points intended to have been taken in the first few days of the battle, and at the price of appalling casualties. The third stage of the battle, in the Ancre area, opened with a preliminary attack by a brigade of Gough's Fifth Army on 14 Sept., which stormed the Hohenzollern trench and a strong redoubt (see HOHENZOLLERN REDOUBT), and diverted attention from the real attack on the 15th. In this attack, for the first time the British made use of tanks, which spread devastation in the Ger. lines. During Oct. and the first half of Nov. more costly but indecisive gains were made, including the capture of Thiepval by Gough's army and that of Combles through Fr. and Brit. movements. Bad weather then set in, and the Germans, who had already begun to prepare what became known as the famous Hindenburg Line (q.v.), far in the rear,

were enabled to cling to the Bapaume salient until such time as they should carry out an orderly retreat. Early in Nov. the British captured the strongly fortified position of Beaumont-Hamel (q.v.), and later in the month they made further advances, but the oncoming winter postponed any further progress. The Brit. casualties in the 5 months' fighting were nearly 500,000. (See SOMME BATTLES; ANCRE, BATTLE OF THE.)

French Attack at Verdun. On 24 Oct. the French made another attack at Verdun. Gen. Nivelle (q.v.) entrusted the attack to Gen. Mangin (q.v.), who by the vigour of his attack took the Germans by surprise and, from Fleury to Fort Douaumont, positions which had taken the Germans months to win were recovered in a few hours. On the Fr. right progress was slower, but on 2 and 3 Nov. first Fort Vaux and then the vils. of Vaux and Damloup were recaptured. On 15 Dec. the French gained still greater successes, capturing Vacherauville, Poivre Hill, Haudromont Wood, and Louvemont on the left, Chambrettes Farm and Caurières Wood in the centre, and Hardaumont Wood and Bezonvaux on the right. To the NE., the Germans had been driven back almost to the positions from which they started in Feb., although to the N. they still retained some of their gains, and the Fr. counter-offensive did not extend W. of the Meuse.

THE COLLAPSE OF RUMANIA. The retreating Rumanians offered strong resistance to von Falkenhayn in Transylvania, and his efforts to advance from the central Carpathian passes towards Bucharest during Oct. were defeated. But by 20 Oct. Mackensen, who had received reinforcements, broke the Russo-Rumanian line, and, on the 21st, cut the railway between Constanta and the bridge over the Danube at Tchernavoda. Constanta was abandoned on the 22nd, its stores of oil and wheat being burned, and on the 25th a span of the Tchernavoda bridge was blown up by the retreating Rumanians, while the Russians hastily withdrew 35 m. to Babatag. Here, on 1 Nov., Sakharov arrived to assume the command with sev. new divs., and a counter-offensive began—but too late, for the Rumanian defence was collapsing in the W. salient. Von Falkenhayn had now transferred his main attack to the Vulcan Pass, still farther to the W., and with fresh reinforcements the Germans continued their advance, and, by 21 Nov., entered Craiova on the main Rumanian railway, thus isolating the W. Rumanian armies. On 23 Nov. Mackensen forced the passage of the Danube between Samovits and Sistovo, and by the 27th he had effected a junction with von Falkenhayn, whose Army had now swung E. across the Aluta and was making an advance on Bucharest, which fell on 5 Dec., and for the rest of the year the Germans continued their brilliant progress E., until the Russo-Rumanian forces found a line where they could make a stand—a line formed by the Danube, the Sereth, and the Putna, ascending to the

Oitos Pass. Sakharov had been forced to withdraw from the Dobrudja, and all that was left of Rumania was its Moldavian prov., less than one-third of the kingdom. The Rumanian court and gov. estab. its temporary cap. at Jassy, near the Russian frontier.

Allied Advance into Serbia. Sarraill's campaign in the S. provided inadequate compensation for the Rumanian disaster and moreover the British were confined on the Salonika front to isolated raids which did not result in any permanent gains. The serious offensive undertaken by Sarraill was towards Monastir, and the Serbian Army played the prin. part in it. The Bulgarian offensive from Monastir in Aug. had penetrated a long way within the Gk frontiers, and threatened to turn Sarraill's flank by an advance to the Gulf of Salonika when Sarraill began his own attack on 7 Sept. The first serious fighting took place to the W. of Lake Ostrovo, where, on the 14th, the Serbs. captured Ekshisu. On the 20th they stormed Mt Kaymakchalan and recovered a footing on their own ter. On the 29th the Serbian gen. Mishitch descended the mts towards the bend of the Tcherma R., and by turning the flank of the Bulgar-Ger. Army, forced it back beyond the Gk frontier. By 15 Nov., although delayed by bad weather, Mishitch had mastered the river-bend and thus out-flanked the enemy's left, so that they were compelled to retreat from Kenali to Bistriza, 4 m. from Monastir, when the French and Russians again attacked. By the 19th the Serbs were threatening the line of retreat from Monastir to Prilep, and accordingly on that day the Bulgars evacuated Monastir. The Allied position was further improved towards the end of the year; but Monastir marked the limit of their advance, and was continually subject to bombardment for another 2 years. Sarraill's campaign had failed to effect a diversion in favour of Rumania; but it had secured Greece from Bulgarian attack.

LLOYD GEORGE AS PRIME MINISTER. Criticism of the Government. In Great Britain towards the end of the year there was increasing irritation over the conduct of the War. The halt on the Somme, the collapse of Rumania, and the failure of Sarraill were all laid at the door of the Brit. Foreign Office and War Office. The rise in the price of food and the apparent failure of the gov. to undertake the necessary methods of controlling supplies gave rise to the fear of famine. It was also felt that the Brit. air organisation was faulty, although the autumn had seen remarkable successes by the Brit. aeroplanes against Zeppelin raiders over Britain. The admiralty was criticised in conjunction with the renewed Ger. submarine campaign and raids on the Channel flotilla. Lloyd George became Prime Minister on 7 Dec., and incorporated in his Cabinet a number of business-men who were to undertake the expert control of various depts.

In France Gen. Nivelle succeeded Joffre as commander-in-chief on the W. front. In Austria the Premier was murdered in

Oct. and his successor compelled to resign in Dec. At the end of Nov. the Archduke Charles succeeded his great-uncle as emperor of Austria. In Germany Bethmann-Hollweg's tenure of office was ending permanently; while in Russia a great disaster was dawning.

THE GERMAN PEACE NOTE. Political Situation in Russia. When the Duma met on 14 Nov., the reactionary gov. of Stürmer was fiercely attacked, and Millukov, the leader of the Cadet Party, accused the Premier of corruption and intrigue with Germany. Stürmer resigned and was succeeded by Trepov, who was handicapped by being compelled to retain Stürmer's prin. lieutenant, Protopopov, at the ministry of the interior. Germany now tried to enlist the inhabitants of the occupied ter. on the E. front in her support. On 5 Nov. she announced that, in conjunction with Austria, she proposed to estab. an independent Poland with a hereditary monarchy and a constitution. The proposal, obviously designed to secure Polish recruits and embarrass Russia, failed of its purpose, while it temporarily stiffened the resistance in Russia even of those elements inclined to show sympathy towards Germany. In Dec. Germany began her first attempt to manoeuvre the Allies into peace. She was becoming apprehensive of the future, with the Allied power growing to ever greater proportions. The Ger. chancellor announced in the Reichstag, on 12 Dec., that he had sent notes to the belligerent powers; the emphasis, necessary for the Germans, on the suggestion that Germany was now victorious in a war forced on her by her enemies, was less convincing to some of the neutrals. It was, moreover, an empty offer, for it specified no terms which Germany would be willing to accept, and these terms could only be deduced from the implicit arrogance of the general statement. On 30 Dec. the Fr. Gov. communicated to the U.S. ambassador in Paris a formal answer, signed by Russia, France, Great Britain, Japan, Italy, Serbia, Belgium, Montenegro, Portugal, and Rumania, in which they declared that there could be no peace until Germany offered reparation, restitution, and guarantees for the future.

INTERVENTION OF THE U.S.A. Effect of the British Blockade on American Trade. On the outbreak of the War, feeling in the U.S.A. on the part of a not inconsiderable element was sympathetic towards Germany. Moreover, the gov. of the U.S.A. was bound by the traditional Amer. policy of avoidance of entangling alliances which dated from the time of Washington. The Monroe Doctrine embodied this policy, and at 2 Hague conferences America had reasserted it. Early in the course of the War, however, the U.S.A. began to realise that she was going to be seriously affected by the actions of the belligerents. The first difficulty arose over the Brit. maritime policy. At the outbreak of war, Great Britain had announced her intention to abide by the Declaration of London (q.v.), which

contained provisions she soon found herself unable to abide by. Presently successive Brit. orders in council altered the Declaration of London beyond all recognition, and the altered conditions were found to interfere with Amer. shipping. America protested; but even thus early in the war the inept Ger. diplomacy in the U.S.A. to some extent counterbalanced ill-feeling against Britain.

In the early months of 1915 the new Ger. submarine policy in answer to the Brit. blockade aroused further ill-feeling against Germany, for Germany had warned the U.S.A. that neutral ships might be sunk during the submarine campaign, and the sinking of the *Lusitania* drew a strong protest from the U.S. Gov. Germany emphasised the justice of the protest by her defiant reply, which led to a further exchange of notes, that presented by secretary of state Lansing, in the middle of July, being particularly stiffly worded. A few days later Ger. submarines sank an Amer. steamer off the Orkneys; but the U.S. Gov. still took no decisive action, partly because her relations with Britain, in spite of much goodwill on both sides, were also reaching an *impasse* over the blockade of Germany declared by the Brit. Gov. in Mar. 1915. The blockade laid down the new claim to seize and confiscate non-contraband goods of Ger. origin, ownership, or destination carried in neutral ships to neutral ports, and during the summer the U.S. Gov. addressed a series of strong protests to the Brit. Gov.

President Wilson's Policy—Effect of German Submarine Campaign—The 'Lusitania.' Feeling in Great Britain at this period was becoming somewhat impatient with America, public opinion being unable to grasp the reasons for Amer. neutrality. During the summer of 1915, the Germans continued to provide the U.S.A. with severe tests of their neutrality. The sinking of the *Lusitania* (q.v.) roused the Amer. people to a true understanding of what Ger. methods of maritime warfare might mean to them, and on 19 Aug. the sinking without warning off Cape Clear of the White Star liner *Arabic* increased their anger, for 26 Americans were among the passengers on the vessel. A week later Count Bernstorff the Ger. ambas., informed Lansing that full satisfaction would be given to America for the sinking and Herr von Jagow, the Ger. Foreign Secretary, announced that Germany had now adopted a new policy which would clear up the submarine difficulty. This policy consisted of a declaration that liners would not be sunk by submarines without warning and without ensuring the safety of non-combatants, provided that the liners did not try to escape or offer resistance. On 4 Sept. another liner, the *Hesperian*, was torpedoed without warning. There was small loss of life, but among the crew were 2 Amer. citizens.

German Agents in America. Relationships were being still further strained by extraordinary revelations about the activities of Ger. agents in America. For

a long time there had been rumours of secret activities of Ger. agents financed by the Ger. embassy in Washington. It was alleged that there had been deliberate falsification of passports, particularly by the Ger. naval and military attachés, Capt. Boy-Ed (q.v.) and Capt. von Papen (q.v.), and that dynamite outrages in Canada and various incendiary fires in U.S.A. factories had also been organised from Washington. During Aug. the *New York World* pub. information proving that Count Bernstorff had control of immense funds for propagandist purposes and that Ger. agents were fomenting strikes in Amer. munition works. These interferences with Amer. internal affairs were brought to a head by the Dumba Case, made public early in Sept. On 30 Aug. the steamer *Rotterdam* touched at Falmouth, and the Brit. authorities seized a number of confidential papers and letters in the possession of an Amer. journalist called Archibald. Among the documents seized was one from Count Bernstorff on the subject of the highly compromising revelations which had been made by the *New York World*. In his memorandum Count Bernstorff denied that Germany had tried to organise strikes or to 'take part in a plot against the economic peace' of America. Archibald's dossier also contained communications from Dr Dumba, the Austro-Hungarian ambas. in Washington, and from von Papen which exposed the falseness of Bernstorff's case. One of Dumba's dispatches to the foreign minister at Vienna contained a full description of the efforts he had made to stir up unrest among munition workers. The U.S. Gov. was compelled to take action, and insisted on the recall of Dumba.

American Note on Allies' Maritime Policy. President Wilson addressed a note of protest against the Allied maritime policy on 5 Nov. It was realised in Britain that such Brit. regulations as that making liable to capture enemy merchandise even in neutral ships was in conflict with previous international agreements, as also was the revised Brit. definition of contraband; but it was generally felt that the necessities of the case justified the action.

Republican Party's Attitude. Up to the end of 1915 President Wilson represented the great body of Amer. opinion in his determination to keep out of any entanglement in the War; but from that time onward the opposing party in the U.S.A., headed by ex-President Theodore Roosevelt and Elihu Root, steadily gathered strength. Germany saw in the note of 5 Nov. hope of a breach between America and the Entente, and when, on 7 Dec., the President's message to Congress denounced Ger. intrigues in America and asked for legislation to deal with them, Germany hastened to repudiate the campaign carried on by her agents in America, and followed this with an offer of settlement of the differences over the sinking of the *Lusitania*. On 15 Feb. Wilson's Cabinet rejected the *Lusitania* proposals and refused to admit a new Ger.

claim to torpedo armed merchant vessels without warning. Two Dutch liners were torpedoed without warning, and on 24 Mar. a submarine sank the Channel steamer, *Suesser*, with a number of Americans among the victims. On 19 April Wilson made a speech in Congress indicting the whole Ger. policy of submarine warfare, which had been embodied in a note to Germany dispatched on the previous day. He concluded with the declaration that 'unless the Imperial Gov. should now immediately declare and effect an abandonment of its present methods of warfare against passenger and freight vessels, the gov. can have no choice but to sever diplomatic relations with the gov. of the Ger. Empire altogether.' This ultimatum drew from the Ger. Gov. the reiterated plea of self-defence against the illegal conduct of Great Britain, but drew also the concession that such vessels should not be sunk without warning unless they attempted to escape or offered resistance. This was accepted by the U.S. Gov. as a specific abandonment of the policy of unrestricted submarine warfare.

American Presidential Election. During the summer of 1916 the relations of America with the belligerents remained quiescent, largely because foreign affairs were overshadowed by the presidential election, in which Wilson was standing for his second term. Wilson was re-elected in Nov. During the autumn of 1916 Germany, as stated in a previous section, began to prepare the way for peace overtures. On 18 Dec. President Wilson himself issued a note which had been prepared before the Ger. peace overture was issued. He took the opportunity of stating the aims claimed by both Allies and Central Powers in the War and of asserting the expressed willingness of both sides to accept a League of Nations to avoid future wars. He then invited each side to set out in detail their views. The Allies accepted the president's statement of their aims and expressed their adherence to the ideal of a League of Nations. Germany issued various statements claiming that the Allies had now 'dropped the mask' and admitted their 'lust for conquest.' On 13 Jan. 1917 the Ger. Gov. announced that all sea traffic within certain areas adjoining Britain, France, and Italy, and in the E. Mediterranean would 'without further notice be prevented by all weapons.' This meant clearly that Ger. submarines would sink at sight all vessels found in these areas.

Diplomatic Relations between the U.S.A. and Germany Severed—Message to Congress. On 3 Feb. the Ger. ambas. in Washington was handed his passports and the Amer. ambas. in Berlin was recalled. On the same day the President announced to both Houses of Congress the severance of diplomatic relations with Germany. On 12 Mar. the U.S. Gov. issued an order for the arming of Amer. merchant vessels, and, quickly following this, Ger. submarines sank 6 Amer. vessels. On 2 April Wilson, at a special session of Con-

gress, asked for a declaration of war. The decision to declare war passed both Houses by 6 April, on which date a state of war between America and Germany came into operation. The entry of the U.S.A. into the War was of great immediate value to the Allies, for although no considerable contingent of Amer. troops could be sent to Europe for many months, the whole of the immense industrial organisation and financial resources of the U.S.A. became immediately available for the Allied cause.

Passing of Selective Service Act. On 28 April Congress passed a Selective Service Act, and in 5 months 1,500,000 men were in training camps. On 25 June, 1917 the first contingent of Amer. troops landed in France. Maj.-Gen. Pershing (q.v.) was appointed Amer. commander-in-chief. Meantime, the Amer. Navy had already begun to co-operate with the British. In May a flotilla of Amer. destroyers arrived in Brit. waters under Vice-Adm. Sims, and took part in the protection of Atlantic shipping. But perhaps the most vital contribution made by the U.S.A. during 1917 was the building of new merchant vessels and war vessels to replace tonnage sunk by the Ger. submarine campaign. Since the announcement on 31 Jan. by Germany of blockaded areas in all the waters round Britain, France, and Italy, and in the E. Mediterranean, the submarine campaign had been increasingly successful. During April the Allies lost some 550,000 tons gross of shipping. After April the losses slowly decreased, and in July the gross tonnage lost was no greater than 320,000; but in the first 7 months of the submarine campaign the Allied losses amounted to some 4,500,000 tons, equalling the total Allied losses from the beginning of the War to the opening of the campaign in Feb. 1917. Home production was increased when possible, so that imports from overseas might be reduced. Essential shipping was protected as far as possible by providing escorts and arranging convoys (the system by which vessels travelled in company under escort of warships), and submarines (or 'U-boats' as they were familiarly known) were attacked with vigour and success. From the beginning it was recognised that America must deal with the question of replacement. She would be unable to send her newly trained armies to France unless the necessary shipping were available for their transport and supply. But by the beginning of 1918 this problem was solved. The staff of the Amer. Army took nearly a year to produce any really formidable addition to the Allied forces on the W. front.

THE BALKANS, 1916-17. Result in Crete. In Greece the position was confused. At the end of Aug. 1916 the Bulgars had seized considerable ter., the Gk. garrisons being sent to Germany. This roused the Venizelist party, and a revolution broke out at Salonika on 30 Aug. under Col. Zimbrakakis, a Venizelist deputy. Regiments were enrolled for service against Bulgaria, and in Sept. a

Gk regiment was sent to the front. On 24 Sept. a sympathetic revolt broke out in Crete, Mytilene, and other Gk islands, and Venizelos left Athens for Salonika, where he formed a provisional gov. of insurgent Greeks. This gov., which was gradually recognised by the Allies, at once declared war on Bulgaria. The mainland of Greece SW. of Salonika remained under Constantine's rule. The king's party formed leagues of reservists to oppose war, while the king continued to evade the demands of the Allies.

Allied Landing at the Piraeus. On 1 Dec. 1916 detachments of Allied troops landed at the Piraeus were driven off with loss. Allied diplomacy played into Constantine's hands, for the councils of the Allies were divided. France and Britain were keenly Venizelist; but the tsar was lukewarm, and Italy feared the emergence of the greater Greece for which Venizelos was working. At the beginning of 1917 the gov. in Athens was, in appearance, in a more reasonable frame of mind. By the end of May Venizelos had 60,000 troops at his disposal. The attitude of the Allies towards Constantine stiffened.

Albanian Independence Proclaimed. On 3 June Italy proclaimed the independence of Albania under her protection, and on the 8th she occupied Janina, thereby cutting communications between Greece and the Central Powers. On the 10th Fr. and Brit. troops entered Thessaly, partly to safeguard the harvest, and partly to occupy certain strategic points, e.g. Volo and Larissa, Sarraïl having long suffered from the attacks of irregular bands of reservists in his rear. On the 11th Fr. troops seized the isthmus of Corinth, and that evening Jonnart, as Allied high commissioner, arrived at Athens, accompanied by Allied transports. In the name of the protecting Powers he demanded the abdication of King Constantine and the nomination of his successor, who was not to be the crown prince.

Abdication of King Constantine of Greece. A crown council was summoned, and King Constantine signed an act of abdication in favour of his second son, Prince Alexander. On the 12th Fr. troops were disembarked at the Piraeus and the ex-king and his family left for Switzerland. The most influential of the pro-Ger. party were exiled. On the 14th the Allied blockade of Greece came to an end. On the 21st Jonnart concluded an agreement with Zaimis for convening under Venizelos the Chamber which had been elected in 1915 and illegally dissolved. Accordingly, on 25 June, Zaimis resigned and Venizelos formed a cabinet.

RUSSIA REVOLTS. The Beginning of the Revolution. Famine was now widespread in Russia, and the feeling among the Russian people against their continued participation in the War was fanned by the Russian Council of Labour ('Soviet'). Nicholas II having abdicated, a provisional gov. was formed under Prince Lvov, the gov. being a coalition of Left and Centre party groups. Miliukov, the Russian foreign minister, in the spring

of 1917, sent a note to the Allies affirming the determination of the Russian Gov. to pursue the war to a victorious end. Soon afterwards, a Coalition Gov. was formed with Alexander Kerensky (q.v.) as war minister. This gov. also proclaimed its adherence to the Allied cause, but the newly formed All-Russia Congress of Soviets was determined to obtain the Allies' acquiescence in the 'principles of the Russian Democracy' as a basis of peace. Strenuous efforts were still being made by the Russian military leaders. Brusilov worked out the plans for an offensive in Galicia, with the object of outflanking Lemberg. The Russian attack began on 1 July, and at first prospered. The Russians had made a considerable advance on the Galician front and had captured some 18,000 prisoners. By 10 and 11 July the important towns of Halicz and Kalisch had fallen to Kornilov's Army. But this was the limit of the Russian success. Hampered not only by bad communications but by desertion and indiscipline, the Russians began to waver before the attacks of the reinforced enemy, and when floods were added to the Russian difficulties the rout began. On the 16th Kornilov was obliged to evacuate Kalisch and to retire all along his front. On that day disorder had broken out in the cap. On the 19th the Austrian counter-attack had developed; one Russian regiment deserted its position and, before evening, the whole front was in chaos. From the 21st to the 23rd, the advance of the Austrians continued so rapidly that they retook Tarnopol and wiped out the whole of the Russian gains of 1916. By the end of July the Russian armies in the S. were driven back to the frontier of Russia, but Prince Leopold did not advance farther. On 2 Aug. Brusilov was dismissed from the supreme command and his place was taken for a short time by Kornilov.

Kerensky Becomes Prime Minister. Kerensky had become Prime Minister in place of Prince Lvov; but his power was already weakening, and he was falling between the 2 opposing groups: these were the growing forces of Bolshevism and the more nationalist elements including the gens. of the Army, who wished to carry on the War. Kerensky made an effort to secure union between the opposing elements, but without effect. Meanwhile the Germans had taken Riga. Alexieiev was sent to organise a hasty defence, and the Germans waited for the coming collapse. Kerensky's vanity caused confusion and unrest among the gens., with the result that when he assumed the position of commander-in-chief and put himself at the head of the Petrograd troops he played into the hands of the Bolsheviks. The more moderate members of Kerensky's Cabinet resigned. A new Council of Five took the place of the former gov. and towards the end of Oct. the Germans had advanced farther so as to threaten Revel. Trotsky had become president of the Petrograd Soviet, and the primary object of the Bolshevik régime was now to get Russia out of the war, and

they continued the negotiations for peace with the Gers.

Trotsky's Repudiation of the Allies. *Brest-Litovsk.*—Hostilities on the E. front ceased on 2 Dec., and fraternisation between the troops began. The Allied Powers formally protested, and Trotsky made a fiery speech denouncing foreign interference. On the 3rd a Russian deputation arrived at the H.Q. of Prince Leopold of Bavaria at Brest-Litovsk, and on the 5th a preliminary conference opened there under the presidency of Gen. Hoffman, Prince Leopold's chief of staff. The Russian delegates asked for the retirement of the Ger. detachments from the ls. in the Gulf of Riga which they had occupied since the revolution, and for a promise that no Ger. forces would be sent from the E. to other fronts. They urged also an armistice on all fronts alike. The Germans refused this request, but finally, on the 15th, a truce was agreed to on the E. front to last from 17 Dec. for 28 days. The meeting at Brest-Litovsk to discuss terms of peace was formally opened on 22 Dec. Von Kuhlmann, the Ger. Foreign Secretary, and Count Czernin (q.v.), for Austria, were the principal representatives of the Central Powers. The Russians proposed a peace without territorial annexations as payment of indemnities. On Christmas Day Count Czernin announced the readiness of the Central Powers to accept such a peace, provided that the Allies pledged themselves to these principles and agreed to join in the negotiations. The conference accordingly adjourned until 4 Jan. 1918 so as to give the Allies time to consider the proposals. On 28 Dec., an agreement was made allowing the resumption of normal diplomatic consular relations between Russia and the Central Powers. Meanwhile, the delegates of Germany and Austria had been preparing drafts for an eventual peace treaty with Russia. In the first draft they declared that as soon as the state of war was at an end and the Russian armies demobilised, the Central Powers would evacuate occupied Russian ter. In the second draft the qualification was introduced that the position of the border provs. was to be referred to a special commission, these provs., being Poland, the Ukraine, Finland, Lithuania, Courland, and part of Estonia, and Livonia.

The Ukraine. The Ukraine was in a different position. Her inhab., the Little Russians, while they had agreed to accept autonomy under the Russian Provisional Gov., did not accept the Bolshevik régime; but they set up an independent rep. establishing peasant proprietors in the land and with nationalist aims, to neither of which the Bolsheviks could agree. The new rep. formed an alliance with Kaledin and the Cossacks, and also with Rumania and Rossarabia. This Ukraine Gov. occupied Odessa, and in the N. and N.E. around Kharkov and Rostov there were numerous engagements with the Bolshevik troops.

Finland—Asiatic Border Provinces. At the opening of the Brest-Litovsk conference the Ukraine was demanding repre-

sentation as a sovereign state. Finland had received autonomy from the Russian Provisional Gov. but had continued to claim full independence, and Kerensky had dissolved the Finnish Diet just before his fall. The Finnish people had thereupon appointed an administration on their own account, which in Dec. decreed separation from Russia. The Bolsheviks had tolerated this declaration, but the Finnish leaders, being of the right and right centre, were exposed to the attacks of left-wing agitators sympathetic to the Bolshevik régime across the border. Strife between 'Red Guards' and 'White Guards' had begun. In the Caucasus and in many parts of Siberia various separatist movements were also in progress, so that everywhere round the border the tendency was towards separate nationalism rather than international Bolshevism.

Separate Peace. On 4 Jan. the period expired within which the Allies were to accept or reject the peace offer. The Allies had made no reply to the proposal. On the 9th von Kuhlmann announced that since the Allies had made no response the offer to negotiate had lapsed, thus compelling the Bolsheviks to negotiate a separate peace, which Trotsky agreed to do on the 10th. On the 11th he agreed to the inclusion of a separate delegation from the Ukraine. On 12 Jan. he laid before the Central Powers the Bolshevik proposals for the evacuation and reconstruction of the Russian ter. now held by the Germans. The Germans refused them, von Kuhlmann declaring that there could be no relinquishment till a general peace had been concluded. Germany was stiffening her terms, as she already saw hope of peace with the Ukraine and with Rumania, which would give her access to the E., and she could then deal with the Bolsheviks at her leisure. On the 16th, in spite of Trotsky's protests, separate negotiations were begun between the Austro-Ger. delegates and the Ukrainians. On the 18th the conference was adjourned and Trotsky returned to Petrograd. On the 18th also the long-delayed Constituent Assembly was opened in Petrograd; but on the 19th it was dissolved by a body of Bolshevik troops. Trotsky, meanwhile, had sent an ultimatum to Rumania on 15 Jan., and another on the 26th to the Ukraine. On the 30th the Brest-Litovsk conference was resumed, and Trotsky made one more appeal against the separation of the Ukraine, and against the Ger. policy with regard to the border provs. Meanwhile Bolshevik troops had taken Kiev and put the Ukrainian Gov. to flight. The Ukraine thereupon turned for help to the Central Powers, and on the 9th peace was agreed upon between the Ukraine and the Central Powers, and the Army of von Linsingen moved E. along the Pripet to defend the Ukraine. Trotsky surrendered to superior force, and on 10 Feb. announced that the state of war with Austria and Germany was at an end. Von Kuhlmann decided that as the Bolsheviks refused further negotiations they must be compelled to agree to the Ger.

terms. Von Eichhorn was ordered to advance against them. He took Reval, Dylnsk, and Pskov and advanced within 150 m. of Petrograd, while von Linsingen relieved Kiev.

German Ultimatum to the Bolsheviks. An ultimatum was presented to the Bolsheviks, demanding acceptance of the Ger. terms, which had now been greatly hardened, within 48 hrs. Lenin declared for surrender, and on 3 Mar. the Bolsheviks were forced into signing the Peace of Brest-Litovsk (q.v.). The Central Powers on 5 Mar. had now also secured a treaty with Rumania, and on the 7th a treaty with Finland. The treaty with the Bolsheviks compelled Russia to evacuate Estonia and Latvia, the Ukraine, and Finland. The dists. of Ardahan, Kars, and Batum were to be handed over to the Turks. Briefly summarised, the results of the Bolshevik foreign policy were that it had lost for Russia a quarter of her total pop., a third of her manufacturing industries, a quarter of her arable land, and some three-quarters of her iron and coal production. For the remaining Allies the Peace of Brest-Litovsk might have been the gravest results. Germany had not only disposed of the E. front, but had secured access to large new supplies of oil, foodstuffs, and cotton, and had cleared the way to Central Asia, where she could do incalculable harm to the Allied cause, threaten India, and foment rebellion in Persia. For Rumania the Russian revolution had meant the defection of the Russian contingents. In Dec. she had been compelled to join in the truce, and on 7 May 1918 had to make peace on the most humiliating terms. She had to give up the whole of the Dobruja, the Petyreny coal basin, and the Carpathian passes, to demobilise her Army, to allow Austro-Ger. transport to pass through Moldavia and Bessarabia to Odessa, and a little later to subject completely the whole of her commerce, including her oilfields, to the control of Austro-Ger. financial groups. (See also RUSSIA, *History*.)

POLITICAL CRISES IN AUSTRIA-HUNGARY AND GERMANY. *German Dream of 'Mitteleuropa' Realised.* The overthrow of the old autocracy in Russia produced political crises both in Austria-Hungary and in Germany. For Allied observers the importance of Austria had been overshadowed throughout the War by her dominant partner; but without the active participation of Austria-Hungary the Ger. dream of *Mitteleuropa* could not be realised, nor the vital plan of the *Drang nach Osten*, the creation of a solid block of ter. under Ger. influence stretching from Berlin to Bagdad, by way of counterbalancing Brit. sea-power. By the end of 1916 this dream had become a reality. The Germans had completely broken up the Austrian armies as separate entities, and not only put them under Ger. commanders but associated them with Ger. troops in every theatre of war. Austria had least desire for war of all the associates of Germany, and, in the first 2 years of war, had suffered very severely. Her

armies had borne numerous defeats, and her people were on the brink of starvation. The Ger. hold on the Austrian armies was strong enough to make any prospect of a separate peace with Austria illusory; but the internal condition of the Austro-Hungarian Empire was increasingly dangerous from the Ger. point of view.

Problem of Oppressed Nationalities in Austria-Hungary. The main problem of internal Austro-Hungarian administration was largely the struggle of the other races against the minority Magyar-Ger. rule. It was obvious that if Austria were to reach an understanding with the new rulers of Russia she must adopt democratic methods. Accordingly, after the Austrian peace offer to Russia on 14 April 1917 the Vienna Cabinet decided to summon Parliament, which had not sat since before the War. The Premier resigned, and on 24 June a stop-gap ministry was formed under Dr Seidler. Meanwhile in Hungary Count Tisza had fallen, but his successor faithfully carried on Tisza's policy of co-operation with Germany, and the Ger. hold on Austria-Hungary remained as firm as ever. (See AUSTRIA, *Austria-Hungary in the First World War*.)

Resignation of Bethmann-Hollweg as German Chancellor. In Germany the consequences of events in Russia were more startling. When in May the chancellor had refused to state his peace terms, he had been supported in the Reichstag by a bloc of the Catholic Centre, the Radicals, and the National Liberals; but in July this bloc went into opposition and joined the Majority Socialists in demanding reform of the Prussian constitution, parl. gov. throughout the empire, and a declaration of war aims, on the lines which had just been laid down in a speech in the Reichstag by Erzberger, the leader of the democratic wing of the Catholic Centre Party. He had demanded a declaration in favour of peace without annexations and indemnities. On 11 July the emperor offered direct and secret ballot for the Prussian Diet, but for a week the Reichstag continued to press its full demands. During that week Bethmann-Hollweg offered his resignation, which was accepted. The emperor ignored the Reichstag in choosing his new chancellor, Dr Georg Michaelis, as likely to be both docile and efficient. But von Kuhlmann, who became foreign minister, was opposed to the military policy. During the summer and autumn of 1917 he showed much skill in trying to estab. Germany's wish for peace both in Allied and neutral countries. But while von Kuhlmann secured certain advantages for Germany by his adroit diplomacy, his path was not made easy by the blunders of the Imperial chancellor, who had failed to conciliate the Reichstag and continually ruined the effect of von Kuhlmann's pacific overtures abroad by his reactionary statements on the success of the submarine campaign and the strength of the Ger. front.

Majority Socialists in the Reichstag. Fall of Michaelis. The errors of Ger.

diplomats in S. America and elsewhere also added to von Kuhlmann's difficulties. In addition, von Kuhlmann was continually opposed by the military chiefs. The collapse of all gov. in Russia, for which von Kuhlmann had worked, was really detrimental to his policy, for it gave fresh hope of 'peace by victory' to the reactionary military party, and revived the flagging hopes of the mass of the Ger. people. When the Reichstag met again in Oct. the Majority Socialists interrogated the gov. on their encouragement of Pan-Ger. propaganda in face of the pacific speeches made by von Kuhlmann and the Austrian minister, Count Czernin. When gov. spokesmen tried to make light of the criticism the Reichstag as an expression of their dissatisfaction referred back a new war vote. The situation was aggravated by an Independent Socialist's reference to a mutiny in the fleet and coupled with an allegation of unjust treatment of the sailors by the gov. Adm. von Capelle averred that the mutiny had been organised in collaboration with Independent Socialist members of the Reichstag. This angered the Socialists, and the chancellor first associated himself with von Capelle's charges and then called for his resignation. Finally, the votes were passed and the Reichstag adjourned, but it was clear that Michaelis could not meet the Reichstag again, and the emperor chose as his successor Count Hertling, leader of the Catholic Centre in the Reichstag.

The Principle of Self-Determination. Meanwhile President Wilson's insistence on the ideal of self-determination for oppressed nationalities was gaining ever wider acceptance as one of the main purposes for which the Allies were fighting, and not only among the Allies themselves but among the subject peoples of Austria and a number of other nations which had hitherto preserved neutrality. Abroad, the ineptitude of Ger. diplomacy, and the continued interference with neutral shipping and supplies by the unrestricted submarine warfare, brought more and more nations into the war on the Allied side. Cuba declared war on Germany on 7 April; Panama followed on 10 April; Siam declared war on the Central Powers on 22 July; China declared war on Germany on 14 Aug. and on Austria-Hungary on 11 Sept., and Brazil declared war on Germany on 26 Oct., while 9 other countries had severed diplomatic relations with Germany. By the end of 1917 only the Argentine and Chile in S. America had not declared war on Germany. There was a strong movement in Spain for a declaration of war on Germany, but a powerful Germanophil party was able to prevent a declaration. The position of all the other European neutrals was becoming precarious since the tightening of the Allied blockade, and their people often suffered as severely from food shortage as the people of some of the Allied countries.

FOOD PROBLEM IN GREAT BRITAIN. Brit. losses on the Somme and the remoteness of any prospect of the end of the war were beginning to affect the temper of the

people. The problem of food supplies was becoming serious with the losses in tonnage from the submarine campaign and the diversion of much of the remaining tonnage to the transport of war material. With the creation of a ministry of food in 1917 and the appointment of Lord Devonport as food controller, steps were taken to meet the serious shortage of grain, and also of sugar and potatoes; but the shortage was followed by high prices, and the situation was not vigorously dealt with until Lord Rhonda took over the food ministry in June 1917. Lord Rhonda instituted an examination of traders' books, and a system of maximum prices for foodstuffs based on this examination subject to weekly revision. Finally, he instituted a compulsory system of food rationing. (See **FOOD CONTROL**.)

The first financial measure of Lloyd George's new gov. was to raise a huge internal loan. The amount raised was £1000m. or £300m. in excess of the provisional estimate of Bonar Law, the new chancellor of the exchequer. Vast sums were urgently needed, for the cost of the war was increasing at an alarming rate.

WESTERN FRONT. January-April 1917 — *German Retreat to the Hindenburg Line.* On the W. front during the first 3 months of 1917 the Allies compelled the Germans to retreat to the strong defensive position they had prepared known to the Germans as the Siegfried Line but to the British as the Hindenburg Line (q.v.). By the end of the first week in April the Germans had been driven back to this immensely strong position. On 9 April the British began their attack along the Vimy Ridge and in front of Arras (see **ARRAS, BATTLE OF**), and by the 11th they had taken the Vimy Ridge, a number of vils., together with numerous prisoners and much war material. A Ger. counter-attack on the 15th failed, and on 16 April the French launched a great attack on the S. part of the Hindenburg Line along the Aisne heights. Nivelle, the Fr. commander-in-chief, had for his immediate objective the S. pivot of the Hindenburg Line at Laon, while to the British had been given the task of attacking the N. pivot of the line around Donai and Cambrai. Nivelle's offensive failed of its main purpose, which was to deal a decisive blow, and after the first few days was abandoned. The second battle of the Aisne (q.v.) lasted for a little more than a month, and was really a failure. In the middle of May Nivelle was replaced in the command by Pétain, who reverted to the old tactics of gradual attrition. In the second half of the year the main fighting on this front was conducted by the British in Flanders.

The Third Battle of Ypres. The third battle of Ypres, also known as the battle of Flanders, consisted of prolonged operations lasting from the end of July to the beginning of Nov., in which the Canadians distinguished themselves in the capture of Passchendaele on 6 Nov. From 20 to 23 Nov. the British also secured considerable gains and many prisoners in an advance at Cambrai (q.v.). But the general results of the Flanders campaign

were small in proportion to the effort, and the actual cost was greater to the British than to the Germans.

NEAR EAST CAMPAIGNS, 1917. *Fall of Bagdad.* In the Near E. Allied prestige, which had waned in 1916, was much restored in 1917. The Allies realised that they must crush the Turks if they were to effect anything in the Balkans. The first movements under the command of Sir Archibald Murray, took place in the Sinai Desert. On 20 Dec. the British entered El Arish, the main enemy position, which had been abandoned by the Turks. On 9 Jan. they captured Rafa, the last Turk stronghold in the Sinai Desert. In

Brit. forces entered Kut without opposition. Gen. Marshall pursued the Turks to Azizieh, half-way to Bagdad, taking some 4000 prisoners. On 5 Mar., after a week's organisation, the advance was resumed, and the following day Ctesiphon was passed without resistance. On the 10th the Turkish position on the Diala R. was captured, and on 11 Mar. the British entered Bagdad. The fall of the city enormously enhanced Allied prestige in the E. By end of April Bagdad was secure from enemy attack, the terminal section of the Bagdad railway was in Brit. hands, and the nearest Turkish forces were 80 m. away. The communications of



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GERMAN STORM TROOPS ON MANŒUVRES NEAR SEDAN, MAY 1917

Feb. an expedition against the Grand Senussi (q.v.) on the W. borders of Egypt was completely successful and drove him into the interior, where his forces could no longer menace Egypt on the W. In Mesopotamia, where Sir Stanley Maude had succeeded to the command of the Brit. forces in Aug. 1916, great improvements had been effected in supplies, transport, and communication. The Brit. commander decided to strike at the Turkish centre in Bagdad. Early in Dec. the preparations were complete, and for the next 2 months the British steadily advanced, clearing the Turks from the r. b. of the Tigris. In the middle of Feb. they attacked also on the l. b., and, having effected a brilliant crossing of the swollen riv. on 23 Feb. were in a position to cut off the retreat of the Turkish troops from Kut; but the attempt was unsuccessful. None the less, the continual advance along the l. b. had so weakened the Turkish position that on the 24th the

the enemy with S. Persia were blocked, and the threat to India removed.

British Advance from Sinai. Meanwhile Murray continued his advance from Sinai, from the Wadi el Arish to the Philistia plain. The desert railway was being pushed along the coast to form a Brit. line of communication similar to the Turkish military line from Beersheba. At first it was thought that the Turks would offer resistance close to the frontier at Well Shaikh Nuran; but on 5 Mar. Brit. aircraft reported that they were falling back. Pursuit was impossible, for the Brit. railhead was still too far to the rear, and the Turks took up their new position unhindered from Gaza to Tel el Sheria, with an advanced post at Beersheba on their left wing. The Ger. gen., Kressen von Kressenstein, who was in active command of the Turkish forces, had great difficulties to surmount. The Turks were thoroughly disheartened. Supplies for the troops were very short, and desertion

was common. It was essential to engage the enemy as soon as possible to prevent him falling back to stronger positions farther N.; and Murray decided to advance up the coast, with Gaza as his objective, so as to keep in touch with the sea, secure better water supplies, and leave an easier course for the railway to follow than would have been possible if an attack had been made inland towards Beersheba. The battle opened on 26 Mar., but the early movements were hampered by a sea fog, so that the battle was still undecided when night fell. For 3 weeks the British were occupied in advancing their railroad and in procuring proper supplies of water for the troops opposite Gaza, while the Turks under von Kressenstein were increased from about 2 divs. to 5 divs. of infantry and 1 of cavalry, and the defences of Gaza were considerably strengthened with new trench systems and great quantities of wire. There was no longer any possibility of taking the Turks by surprise; but in the difficult country it was impracticable to revise the plans in the time available so that Murray now prepared for a frontal attack. The attack began on 17 April, and with the assistance of tanks the outer line of defence was taken with but few casualties. The attack on the main position developed on the 19th, but no considerable advance was made and the Brit. losses amounted to some 7000 men. Murray wished to renew the attack on the following day; but his Army commanders disagreed, and urged him to await reinforcements. Thereafter the troops settled down to a long period of inaction, varied only occasionally by cavalry raids. Murray was then replaced by Sir Edward Allenby (q.v.).

General Allenby Appointed to Command in Egypt and Palestine. The check at Gaza was a serious reverse after the brilliant conduct of the Sinai campaign, and for the time it appeared that the British had reached a condition of stalemate similar to that experienced in Gallipoli. The reverse was partly due to the difficulty of the country and partly to the release by the Russian revolution of Turkish troops from the Caucasus, which had been transferred to Syria. It was becoming evident that the capture of Jerusalem must be the ultimate objective of the Palestine force, for, while Jerusalem had small military value, the capture of the holy city would be a resounding political triumph. Allenby determined to secure Beersheba first, since he would then be in a position to take the main fortresses in the rear. Meanwhile he proceeded on 27 Oct. to shell Gaza, so as to give the impression that he intended an attack in force on that city. The attack on Beersheba assisted by a cavalry enveloping movement from the NE. was successful, and the town was occupied on 31 Oct., some 2000 prisoners and 30 guns being taken. Before developing the attack on the now exposed left flank of the Turkish defences at Gaza, Allenby began a frontal attack intended to draw off the Turkish reserves to that quarter.

On 1 and 2 Nov. this operation was carried out with such complete success that Gaza was outflanked on the W. and a reserve div. had to be sent to this front from the left flank. Water and transport difficulties now delayed Allenby's main attack, which had outrun the railroad; but by the 7th Gaza had fallen and the Brit. troops were pursuing the retreating Turks up the coast. The enemy had suffered some 15,000 casualties. On the 9th he occupied Ascalon, and through intense heat the troops struggled on towards the junction of the Jerusalem railway, which was captured on the 14th.

Fall of Jerusalem. Jerusalem was now directly threatened, and frantic efforts were made to save the city. Allenby seized Jaffa, but on 22 Nov. the Turks suddenly began a series of vigorous counter-attacks, which continued until the end of the month and prevented the British from making much further advance. But the opportunity was taken to bring up the Brit. guns and improve the roads for the final advance. Meanwhile Jerusalem was in confusion, and when the British attacked on 8 and 9 Dec. the Turkish civilians began to evacuate the city, and on Sunday, 9 Dec., the Turkish garrison retired and Brit. patrols entered. On the 11th Allenby entered by the Jaffa Gate. Meanwhile Sir Stanley Maude had been improving his position in Mesopotamia, but he *d.* suddenly on 18 Nov. of cholera. (*See MESOPOTAMIA, First World War Campaigns in Mesopotamia.*)

INTRIGUE IN WESTERN EUROPE, 1917. Stockholm Conference. The invitations which had been issued to the Stockholm Conference in April had been vigorously discussed by the Socialists of the W. Allied countries. When the Soviets pressed for a conference on the formula 'no annexations or indemnities' there was some weakening in the Allied refusals. A plenary conference was proposed for Aug., and 4 representatives of the Soviets toured W. Europe to prepare the ground. It was soon evident that the Soviets had no interest in nationalities and their sole purpose was to prepare for the international class war. Opinion in the Allied countries on the subject of the conference became still more hopelessly divided, and the Trades Union Congress finally repudiated the idea of any conference at that time. But in Aug. the Pope issued an appeal to the belligerent states to consider concrete proposals for peace, which, however, seemed to the Allies all in Germany's favour. President Wilson on behalf of the Allies issued a reply setting forth their view that such terms would involve unending future conflict and the estab. of an armed confederacy to ensure that Germany observed the terms.

Clemenceau becomes Premier of France. Successive Fr. Ministers had been so complacent towards pro-Ger. Socialists such as Malvy (q.v.), Caillaux (q.v.), and Polo (q.v.), that it was not until Clemenceau (q.v.) became Premier in Nov. that their activities were checked. Promptly on his accession to power he arrested and

tried Polo and the smaller conspirators, exiled Malvy, and finally, in Jan. 1918, had Cadieux arrested and brought to trial before a court-martial on the charge of endangering the safety of the State. The charges against him were, however, never proved.

ITALIAN FRONT, 1917. *Cadorna's Appeal for Allies' Assistance.* In May 1917 Cadorna made a great effort to outflank one great obstacle to his E. advance, the Bosco di Ternova, by seizing the Bainsizza plateau and the valley of Chiapovano; but this difficult advance failed, and he then turned his attention once more to Monte Hermada, where the Italians gained a footing on 23 May, only to be driven off again by an Austrian counter-attack on 5 June. It became clear that Italy could not succeed by her own unaided efforts, and in July Cadorna appealed to Britain and France for help. Britain sent some batteries of artillery, but neither could spare infantry. Hence in Aug. Cadorna resumed his attack alone. In spite of certain initial successes, the Italians were again driven back by Austrians recalled from Russia, and by the end of Sept. Cadorna's main operations were at an end. Ludendorff had for some time been preparing to apply Ger. methods to the It. front, and in Aug. he transferred von Below from the W. front to the It. and gave him command of 6 Ger. and 7 Austrian divs.; the plan was to dispense with the devastating preliminary bombardment, and to rely on picked troops to break through the enemy lines, and to follow up the first of such troops with wave after wave of fresh troops. The part of the line to be selected for this new method was the Isonzo front in the neighbourhood of Caporetto, where the It. troops were reported to be disaffected.

Italian Defeat at Caporetto. It was on this front that von Below intended to attack. The attack began on 24 Oct. in heavy rain and snow, which helped the Germans by increasing the element of surprise. The Second Army, which comprised the disaffected troops, broke immediately, so that by the morning of the 25th the Germans had crossed the Isonzo, had taken Monte Matajur, which was 5000 ft high, and were across the It. frontier. They had nullified in a day all the It. gains of the previous 2½ years. For a full account of this battle see **CAPORETTO, BATTLE OF.**

British Expedition to Italy. The British sent a corps under Plumer and the French sent one under Fayolle. The Austrians, however, captured the heights above the Venetian plain, until in the middle of Dec. they reached the limit of their invasion, from which time the Italians with the Fr. and Brit. contingents began to drive them back. The fighting continued well into 1918 without much change in the position. Nevertheless, it had been a brilliant military success for the Central Powers.

FORMATION OF ALLIED COUNCIL AT VERSAILLES. At a conference at Rapallo on 5 Nov., attended by Lloyd George,

with Gen. Smuts, Sir Wm Robertson, and Sir Henry Wilson, on behalf of Britain, by Painlevé and Gen. Foch for France, and by Orlando, Baron Sonnino, and Alfieri for Italy, it was decided that an Allied Council should sit at Versailles. Cadorna was sent as It. representative to Versailles, while his place as commander-in-chief was taken by Gen. Diaz (q.v.), who had been very successful in the Carso battles. (See also **CADORNA, MARSHAL.**) At the end of this critical year the strong men on the Allied side were Lloyd George, Clemenceau, Orlando, and Wilson. Clemenceau gave valuable support to the newly emphasised war aims of the Allies, to their determination to secure a lasting peace by the eventual estab. of a League of Nations. But at this point the influence of President Wilson was greatest among the Allied leaders, and on 8 Jan. 1918 he issued a statement of America's war aims embodied in 14 points. (See **FOURTEEN POINTS.**)

BRITISH WAR ORGANISATION IN 1918. *Allied Naval Council.* The opening of 1918 found Great Britain shouldering the heaviest burdens she had been called upon to bear during the War. During 1917 the Army had been increased by 820,645 men, and some 700,000 men and 800,000 women had been incorporated in civilian organisations for warwork. A million additional acs. of land had been ploughed, Brit. shipping replacements had reached 624,000 tons during the year, the number of guns available for France had increased by 30 per cent. and the supply of aeroplanes was two and a half times as great as in the preceding year. The ministry of food had regulated the supply of essential foodstuffs, so that in the winter there was no real want. In Dec. an Allied naval council was set up in Paris to co-ordinate naval policy, and by Feb. 1918 the submarine menace seemed to have been largely overcome. Air-raids entered upon a new phase in 1917, when the Zeppelins were largely displaced by aeroplanes which raided various Eng. tns during the summer in daylight, and, after the defences had been improved, on moonlight nights during the autumn and winter. Though there was no lessening of the determination of the Brit. people to carry the war to a successful conclusion, there was considerable bitterness over the prodigal wastage of Brit. troops in the unsuccessful operations on the W. front during the autumn.

GERMAN PREPARATIONS FOR SUPREME EFFORT. *British Western Front Weakened.* Lloyd George's gov. did not fully appreciate the position on the W. front, where Germany was preparing a great spring offensive. Brit. and Fr. strength on that front had been weakened by the It. campaign, and the Brit. front had been further extended with little reinforcement. The Brit. Cabinet continued to keep over 300,000 troops in Britain, possibly because of revived scares of a Ger. invasion of England. Meanwhile, the Germans were able to transport troops from the E. to the W. front to counterball the slight numerical superiority which the

Allies had now secured on that front, and it is probable that they had a margin of about 250,000 men in reserve. On the Allied side there was no chance of any immediate increase. Sev. months must elapse before the Americans could put any appreciable number into the field, and France had reached the limit of her resources.

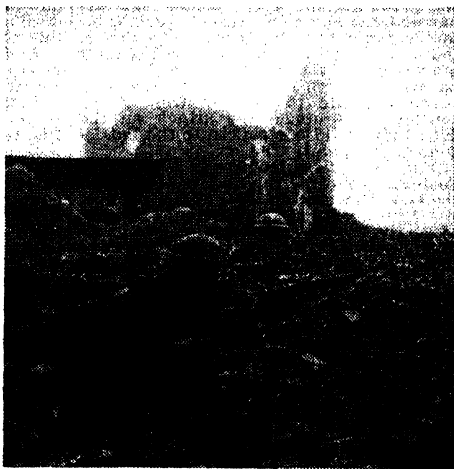
German Military Plan and the Reichstag. Sometime in Feb., Ludendorff and Hindenburg met the Reichstag in secret session and explained their plan. They promised complete victory in the field before the autumn. It was admitted that

take adequate steps to meet the threat. The essence of the Ger. plan, as of the original Ger. plan at the opening of the War, was speed. At the opening of the attack it was announced that the emperor was in command.

GERMAN OFFENSIVE OF SPRING 1918. Attack on British Fifth Army. The offensive began at dawn on Thursday, 21 March, precisely against that sector of the Brit. front indicated by Sir Henry Wilson 2 months before, and, it would seem, also by Gen. Gough commanding the Fifth Army, who had 14 divs. on the Oise sector, against approximately 40



THE GERMAN OFFENSIVE OF SPRING, 1918
Canadian troops of the 87th Battalion resting in a trench near Willerval, April.



Imperial War Museum: Crown Copyright
A patrol of the 1st Cameron Highlanders (1st Division) at Culinchy, 17 April.

the great Ger. offensive must necessarily be costly, the Ger. losses being estimated at 1,500,000. The Reichstag approved this plan, which was to be achieved through the isolation of the Brit. Army, effected by separating it from the French on its right and confining it between the Somme and the Channel. This accomplished, the Brit. Army could be held with a few troops, and the main attack could then be directed against the French, who would collapse under the weight of the attack of the whole Ger. force. The first objective, therefore, must be the junction between the French and British, which the Germans assumed would be weak. Owing to the intricate railway system which the Germans commanded behind their lines, they could concentrate troops rapidly at any point in their rear, and send those troops along their railways to any point on the front selected for the attack long before the Allies could

Ger. divs. The Ger. offensive was helped by abnormally dry weather, which reduced the strength of the water defences on the right of the Brit. line, while a dense fog favoured the attack on the Brit. forward positions. Ger. infantry crossed the Oise canal at La Fère unobserved, and many Brit. outposts were surrounded before it was realised that the attack had begun. The Fifth Army suffered severely in the first day's attack, and lost ground W. of La Fère and N. of St Quentin. Byng with the Third Army farther N. had also been compelled to abandon many vils., and the Germans had reached St Leger in their effort to thrust a wedge between Arras and Cambrai. On the 2 following days the Germans made vigorous attacks along the line of the Somme, and the Péronne bridge-head was abandoned. On the 24th the Third Army surrendered Bapaume and nearly all the gains of the Somme campaign of 1916,

while on the 25th they were driven back to their old positions on the Ancre, thus exposing the flank of Gough's Army, whose right and centre had also been driven farther back. On the 26th the Germans broke through the old Brit. line between Beaumont-Hamel and Hébuterne and reached positions they had not occupied since 1914; but here they were finally held. Gough, however, had to give still more ground, and gaps appeared between his line and Byng's on his left, and between his line and the French on his right. On the 27th it appeared likely that the Germans would destroy the liaison between the different armies, but the great vigour of the attack had exhausted the attacking armies, their communications now lay across the devastated area, and rain was hampering their movements. When von Below's comparatively fresh Army (originally disposed opposite the British from Arras southward) resumed the attack on the 28th they could not penetrate the battle-zone at any point.

Failure of German Offensive North of the Somme. This was the decisive failure of the Ger. offensive and, N. of the Somme, the Brit. front was now secure; but S. of the riv. the Germans continued to make some progress. During the next few days the situation continued to be grave for the Allies; but the retreat had now merged into a battle in which they had some successes. A hastily organised Fourth Army reinforced Gough's Fifth Army, which had, however, recovered its equilibrium under extraordinary difficulties; while, at this time, the important decision to appoint Foch as commander-in-chief of the Allied armies on the W. front was taken at a conference on the 25th between Haig, Pétain, Milner, and Clemenceau. On 4 April von Hutier tried to reach Amiens and drove back the Allies some distance farther, but did not reach the city. In the thwarting of the Ger. offensive Canadian troops had played an important part.

Results of the German Offensive. The great Ger. attack had failed in its object of breaking the Allied line; but it had achieved much more than any Allied offensive during the whole war. By 4 April the Germans claimed 90,000 prisoners and 1300 guns, and the Brit. Fifth Army had been partly destroyed. (See FRANCE AND FLANDERS, FIRST WORLD WAR, CAMPAIGNS IN.) This great offensive did not exhaust the Ger. effort, which was resumed on 9 April; but the offensives that followed were not on the scale of the first, and showed signs of indecision in the Ger. high command. Ludendorff now had to choose between the dangerous admission that the chief object of the offensive had failed and the attempt to palliate the true military situation by a fresh onslaught. Anticipating an attack in Flanders, Haig had arranged to relieve the 2 Portuguese divs. which had been holding the front from the Lys to La Bassée, but he could replace them only by tired Brit. divs., and the change had only been half effected when

Ludendorff launched the attack of 9 April (battle of the Lys). The Portuguese broke quickly, the Brit. flanks on either side were turned, and the whole centre had been lost in a few hrs.

Battle of the Lys. Between the 9th and the 12th a considerable advance had been secured by the Germans; but they had lengthened instead of shortened their line and were left in a salient. The necessity of obtaining some commanding positions compelled the Germans to convert this movement from a subsidiary to a major operation, and they continued to hammer away at this sector until the end of the month. Local fighting continued until late in May, but it was clear that Ludendorff's second offensive had met the same fate as his first.

British Counter-measures. Meanwhile, in Great Britain, a new Military Service Act was passed to extend the liability to military service to all men under 51 and to bring Ireland within its scope. But the raising of the military age tended rather to weaken Brit. industrial power than to increase military power, and the extension to Ireland only inflamed that country and delivered it over to Sinn Féin, thereby necessitating the diversion to Ireland of large numbers of Brit. troops to engage in a bitter civil war there. A wiser but belated move was the prompt dispatch to France of the 300,000 troops which had been kept in England.

AMERICAN ARMIES IN FRANCE. Allied Premiers Make an Appeal to America. As quickly as troops could be organised, in the early part of 1918, Americans were sent into line with the Allies. On 19 Jan. 1918 the Amer. 1st Div. took over a sector N. of Toul; the 26th went to Soissons early in Feb., and the 42nd near Lunéville. The 2nd Div. was stationed near Verdun, 18 Mar. Meanwhile a skeleton of the future Amer. Army was being built up with H.Q. at Neufchâteau. The attack on Gough's Fifth Brit. Army alarmed the Allies and the U.S.A. Lloyd George sent an urgent request that Lord Reading, the Brit. ambas. to the U.S.A., should ask President Wilson to accelerate the sending of Amer. troops, the Allies undertaking to provide for the manufacture of the necessary artillery, aeroplanes, and machine-guns, as the Amer. programme of manufacture was still in its early stages.

The Americans and British between them transported safely through mine-fields and submarines some 2,000,000 Amer. troops to France; and 2,000,000 more were being made ready. But the crisis still continued. Foch had presented to the Allied Prime Ministers a statement of the utmost gravity, pointing out the numerical superiority of the Germans in France, where 162 Allied divs. were opposed to 200 Ger. divs., there being no possibility of the British and French increasing the number of their divs. Foch therefore urged that the greatest possible number of infantry and machine-gunners, in which respect the shortage of men on the side of the Allies was most marked, should continue to be transported from

America in the months of June and July to avert the immediate danger of an Allied defeat in the summer campaign. He placed the total Amer. forces required at no fewer than 100 divs. The troops were forthcoming, and during the summer 300,000 men crossed the Atlantic every month.

GERMAN ATTACK ON THE CHEMIN-DES-DAMES. *German Armies reach the Marne.* Ludendorff attacked the French at the Chemin-des-Dames on 7 May, and he was able to achieve the most rapid advance of the War on the W. front. Soon the French had lost all their gains since Oct. 1914 and were back again beyond the Aisne. The Brit. divs. were forced to retire to the Aisne. By that time the French had been driven back from the Aisne nearly to the Vesle, and on the 28th they were driven well S. of the latter riv. On the 29th the Germans broadened their front by taking Soissons, and on the 30th the apex of the salient they had made had reached the Marne between Château-Thierry and Dormans. For 3 days they had advanced at the rate of 10 m. a day, capturing some 40,000 prisoners and 400 guns. From that time, however, the pace slackened, although the Germans continued to drive the French back on the W. of the salient along the Savières R. Amer. troops drove the Germans back SW. of Château-Thierry on 4-5 June, and Brit. troops recaptured Bligny, SW. of Rheims. The next Ger. attack on 9 June, between Montdidier and Noyon, was a failure.

BRITISH NAVAL RAIDS ON ZEEBRUGGE AND OSTEND. The purpose of the Brit. naval raids, which took place on 23 April, on Zeebrugge and Ostend was to block the submarine and destroyer exits from those ports both of which were connected by canals with Bruges. At Zeebrugge a party landed on the mole and destroyed its works, while a submarine loaded with explosives was run under the viaduct and exploded. Meanwhile the block ships were sunk and the survivors of their crews were rescued by the *Vindictive* and her consorts. At Ostend the block ships were sunk outside the centre of the fairway; but on the night of 9-10 May the effort was repeated with better success by the *Vindictive*. These raids hampered the Ger. submarine campaign to some extent and destroyed the residue of Ger. sea-power; results which were proved by the safe transport of hundreds of thousands of Amer. troops across the Atlantic. (See OSTEND, and ZEEBRUGGE.)

THE ITALIAN FRONT. Austrian Advance. With the check they had suffered in their offensive on the W. front, the Germans could only hope for success in the Austrian offensive launched against the Italians on the Piave on 15 June. No Ger. troops could be spared for this offensive, and moreover, the Italians had laboured strenuously to strengthen their defences while the front had been quiescent during the spring. The Austrians were in no condition to conduct a successful offensive, but it was hoped that Ger. tactics might supply the place of Ger.

troops. There were 2 battles, one in the mts whose object was to turn the whole It. front on the Piave, and the other a frontal attack across that riv. between the Montello, the pivot of the mt and riv. fronts and the sea. The mt attack was the more promising, but achieved less success. That front was partly held by Fr. and Brit. troops, and an insignificant advance which the Austrians made on the 15th was stopped on the following day. The attack on the Piave was at first more successful; a good deal of the Montello was captured, a serious impression was made on the It. right wing at San Dona di Piave, and 14 new bridges and nearly 100,000 Austrian troops were thrown across the riv. But fortune favoured the Italians, for torrents of rain flooded the riv. and broke 10 of the Austrian bridges.

Italian Counter-attack on the Piave. On the 18th the counter-attack began, and by a brilliant combined movement by soldiers and sailors the Austrian left was turned on the 21st. On the 22nd a general retreat across the riv. was ordered. It was skilfully conducted, and the Austrians escaped with slight losses, considering the precarious position into which they had fallen. Their offensive had been a complete failure, but Gen. Diaz did not follow up his success.

MARSHAL FOCH'S COUNTER-OFFENSIVE. German Retreat Begins. Ludendorff had no choice but to proceed with his offensive, which had now become a gamble. His next attack began on 15 July with the object of encircling the Montagne de Rheims, the chief bastion of the line of communications between Paris and the E. front on the Meuse. Simultaneous attacks were made to the E. and to the SW. of Rheims. The first was unsuccessful; but on the SW. the Germans advanced some 3 m. across the Marne. But by the evening of the 17th the Allied forces were successfully counter-attacking all along the line, and at dawn on the 18th Foch delivered the blow which was the turning point of the whole war. His strategical plan was brilliantly conceived. In the forests of Compiègne and Villers-Cotterets, he had assembled reserves in considerable numbers. From the Aisne S. to the Ourcq, Mangin commanded an Army containing the pick of the Fr. colonial troops, and thence to the Marne was Degoutte's Army which included 5 Amer. divs. Before them ran the Ger. flank weakly guarding the line of communications with the Ger. front on the Marne. Led by light tanks, the French early on the 18th broke through the Ger. defences on a front of 27 m. and advanced from 2 to 5 m. towards the Soissons-Château-Thierry road. By the 20th the Germans had regained the N. bank of the Marne, but without serious loss. On the 21st they abandoned Château-Thierry, and on 2 Aug. the French were in Soissons. By the 3rd the Germans had been driven across the Vesle and the salient had been flattened out. Elsewhere there were signs that the Germans were breaking. On 4 July Australians and Americans

together had captured Hamel. On the 19th the British had recaptured Meteren at the apex of the Ger. salient across the Lys, and Merris fell on the 30th. On 4 Aug., the Germans withdrew from all their ground across the R. Avre. But the first great success was Rawlinson's advance with the Fourth Army on the Avre and along the road from Amiens to St Quentin on which the Germans had made their W. drive in Mar. On the first day the Germans were driven back 7 m. Thenceforward the advance continued steadily all along the line.

American Attack on St Mihiel Salient. With Amer. troops now pouring in, Allied superiority in numbers was merely a question of time; for even with their troops drawn from the Russian front, the Germans could not replace their losses. Foch now allowed Gen. Pershing to attack the St Mihiel salient, which had been held by the Germans since 1914. The reduction of this salient would prevent the Germans from placing the Paris-Nancy railway under their artillery fire and would also free the railway leading from St Mihiel to Verdun. The salient was in difficult wooded terrain with the enemy holding the heights of the Meuse. The Allies sent an ample force of heavy artillery. At dawn on 12 Sept, after 4 hrs of violent artillery fire, the attack was launched and was successful; 16,000 Ger. prisoners were taken, as well as 443 guns and a large quantity of material and supplies. On the 15th both Austria and Germany made overtures for peace, but President Wilson returned an unsympathetic reply.

British Advance through Flanders. Meanwhile the British were pushing forward in Flanders. On 27 Sept. the First and Third Armies forced the Canal du Nord and by the 30th the Brit. menace forced the Germans to surrender St Quentin to the French. On the same day Brit. and Colonial troops took points both N. and S. of Cambrai. Of the 4 operations concerted by Foch with Haig, those of the Amer. and Brit. had been successful, and the Belgian attack from Ypres on 28 Sept. equally so, with the capture of Dixmude on the 29th; while the third resulted in the gradual driving back of the Germans in the combined Belgian and Brit. attacks from Armentières, La Bassée, and the whole of the remainder of the Droocourt-Quéant line. The French and Americans had great difficulty in the Argonne and on the Meuse, but progress all along the Fr. front continued during Oct., and on the 11th the French took the Chemin-des-Dames and on the 13th La Fère and Laon. The check to the Americans enabled the Germans to transfer reinforcements to Cambrai and Valenciennes, so that Cambrai did not fall until the night of 8 Oct. On the 10th Le Cateau fell.

Closing Battles of the Western Front. In Oct. Belgian and Fr. troops under Degoutte and the Brit. Second Army under Plumer attacked the whole Flanders front, and by the 17th Ostend had been abandoned, on the 19th Zeebrugge and Bruges, and by the 21st the Germans

had been driven back 20 m. from the sea and were trying to make a stand on the Lys Canal in front of Ghent. To the S., also, the withdrawal was equally complete. Lille and Douai were entered on the 17th, and by the 21st the Brit. Second and Fifth armies had advanced to the Scheldt on a front of 20 m. From the 17th to the 25th fighting continued along the line of the Selle, and these battles yielded 21,000 prisoners. On the 26th Ludendorff resigned. All Germany's other allies had collapsed, and she was left alone to meet the decisive battles of early Nov. The decisive actions took place on the right and left of the Allied line, and were carried out respectively by the Americans and the British. On 1 Nov. the Ger. line on the Meuse was broken, and during the next few days the Americans rapidly followed up their advantage, until, on the 7th, they reached Sedan. Pershing's great attack on the Meuse-Argonne Front began on 26 Sept. and lasted almost continuously until the very eve of the armistice, when the Americans had all the Argonne in their hands. (See ARGONNE.) In the meanwhile the Fr. centre was also advancing, and on the morning of 11 Nov. the Allies were converging on Namur. This rapid pursuit of the Ger. centre had been made possible by the final blow given to the Germans by the Brit. forces in the battle of the Sambre in co-operation with Debeney's Army southwards. A great victory was won, which definitely broke the Ger. resistance. By the 9th Maubeuge itself had fallen; Tournai was occupied on the same day, and early on the 11th the Canadians captured Mons. At 11.0 a.m. on that day fighting ceased all along the W. front, according to the terms of the armistice which had been arranged (considered in the next section), and the Brit. Army thus ended its campaign on the W. front where it had begun it 4 years previously.

THE ALLIED VICTORY. President Wilson's Terms to Germany. However difficult the Ger. submarine blockade may have made the problem of feeding the Allied peoples, the pressure of the Allies' blockade of the Central Empires was so serious that at times there was serious risk of famine. The food situation had become so alarming in May 1916 that a food dictatorship was set up in Germany with the widest discretionary powers to regulate the supply and consumption of foodstuffs. In the summer of the same year there were riots in Munich and Essen over food difficulties. In these circumstances it is remarkable that the Central Empires avoided famine for 3 years thereafter, though occasionally they had good fortune, as in 1917-18, when, through the collapse of the Russian front, huge stores of grain found their way to the Central Empires. Towards the end of Sept., it was obvious that the Ger. offensive in the W. had failed, while Bulgaria and Turkey were on the verge of defeat and Austria was pleading for peace at any price. The effects of the Brit. blockade were now felt, and starvation

was rampant in the countries of Central Europe. The Ger. high command was compelled to urge the civilian authorities to hasten their negotiations, but it was first necessary to set up a gov. in Germany with which the Allies would agree to negotiate. On 30 Sept. the Emperor accepted the resignation of the secretary, and all the other ministers resigned their posts. The most urgent necessity was to provide an imperial chancellor who would represent the new democratic attitude so essential as a façade for negotiation. The emperor chose Prince Maximilian of Baden, cousin of the Grand Duke of Baden and president of the Upper House of the Baden legislature. On 4 Oct. he sent a note to President Wilson, asking him to undertake the work of restoring peace, and to invite the Allies to send plenipotentiaries to open negotiations. He stated that Germany accepted the president's proposals set forth in the Fourteen Points (q.v.) as a basis for peace discussions. He asked for an armistice. On the same day the Austro-Hungarian Gov. sent a similar message to President Wilson: he asked if Germany now accepted the terms he had previously laid down, and then demanded a complete withdrawal of the troops of the Central Powers from invaded ter. Thirdly, he asked if Prince Max spoke for the authorities of the Ger. Empire who had so far conducted the war. The Ger. reply delivered on the 12th answered the president's first and third questions in the affirmative, and expressed the willingness of Germany and Austria to evacuate invaded ter. if a mixed commission could make the arrangement. But only an armistice involving surrender could secure to the Allies the military advantage won with such great effort. Prior to 14 Oct., on which date Wilson replied, events had occurred which were not without their bearing on the Allies' attitude. On the 10th the Irish mail boat had been sunk with the loss of nearly 500 lives. On the 14th was issued the report of a Brit. committee on the harsh treatment by Germany of prisoners taken in the spring of 1918. Furthermore, in their retreat the Ger. armies were burning and looting to render the Allied pursuit as difficult as possible. Wilson announced that no armistice could be considered while Germany continued these unlawful and inhuman practices. He also asked for some guarantee that the Ger. Gov. was no longer the arbitrary power against which the Allies had been fighting, and emphasised that the conditions of an armistice must be left to the Allies' military advisers, and that no conditions could be accepted which did not absolutely safeguard the Allied military supremacy. On 20 Oct. Germany agreed to these demands, trusting to the president to approve no demand 'irreconcilable with the honour of the Ger. people.' The Ger. Gov. claimed that the new gov. in Germany was free from all arbitrary influence, and had been completely democratised. On the 23rd Wilson rejected this claim. 'The gov. of the United States, cannot deal with any but veritable representa-

tives of the Ger. people, who have been assured of a genuine constitutional standing as the real rulers of Germany.' Acceptance of these terms implied complete surrender, and on the 27th Germany accepted them, declaring that peace negotiations would be conducted by a people's gov.

The Armistice with Germany. At 5 o'clock on the morning of 11 Nov. 1918 an armistice was signed between Germany and the Allies, and fighting ceased on the W. front at 11 a.m. on that day. The terms of the armistice included the immediate evacuation of all conquered ter. and withdrawal behind the Rhine, leaving the whole l. b. and all important bridge-heads open to Allied occupation and a neutral zone on the r. b.; the repatriation of all the transported inhab. and Allied prisoners of war; the quashing of the treaties of Brest-Litovsk and Bucharest, and the withdrawal of all Ger. troops from ters. formerly belonging to Russia, Rumania, and Turkey; the surrender of thousands of guns, locomotives, aeroplanes, of all submarines fit for sea, and of the greater part of the Ger. Navy. The surrender had been forced upon Germany by the imminence of military collapse, and revolution quickly followed. It was precipitated by an order to the Ger. fleet to fight. The crews mutinied and the revolt spread during the first week of Nov. to Kiel and other ports, and thence throughout Germany. Every Ger. throne was overthrown, and on 9 Nov. the emperor abdicated, fleeing with the crown prince to Holland. The crowning humiliation was the peaceful transference of the Ger. Navy to Scapa Flow on 21 Nov., to be scuttled by its own crews on 21 June 1919. Only in one remote Ger. outpost did an audacious commander continue to resist until 25 Nov., namely in Ger. E. Africa, where an entirely isolated force under von Lettow-Vorbeck (q.v.) had carried on a brilliant guerrilla war all through the 4 years of war.

EVENTS IN RUSSIA (1918-19). Bolshevik Relations with Germany. After the treaty of Brest-Litovsk, the Ger. relations with the Bolsheviks varied from equivocal association to open hostility. During April and May Trotsky made abortive efforts to raise a Red Army to drive the Ger. invaders from Russian soil; but with the advance of a Czechoslovak contingent in the SE., Germany was forced to make an agreement with Lenin, by which she undertook not to advance farther E. than a specified line from the Gulf of Finland to the Black Sea, and the Bolshevik forces were therefore able to give their undivided attention to the Czechoslovaks on the Volga. But in Finland, where Germany had hoped for a new outlet for her influence, Red Guards and White Guards continued to fight, and although a Bolshevik ambas. was sent to Berlin, and a Ger. ambas., Count Mirbach, to Moscow, the Count was assassinated on 7 July, and his successor, Haefferich, paid only a hurried visit and departed for Berlin to avoid a similar fate. In the Ukraine Germany pillaged the country of

supplies for her own use, so that everywhere the peasants rose in revolt, and there were many murders and guerrilla warfare, culminating in the assassination on 30 July of F.-M. von Eichhorn (q.v.) in the streets of Kiev. The Ukraine had previously been made into a Ger. prov. administered by an ataman, Gen. Skoropadski, who was nominated by Berlin; Ger. rule was unenlightened, and resulted in this universal rising, which had its effect throughout Russia. Meanwhile in Russia the attacks of the Czechoslovaks and the Allied intervention (*see below*) had put the wildest elements in power. On 16 July the ex-tsar and his family were shot. On 6 Sept. Lenin signed 3 further treaties with Germany, giving every kind of security for the satisfaction of the Ger. claims. The Baltic provs. were to have their frontiers defined as Germany pleased. Baku and its oil region was to be made a Ger. preserve, and immediate payment was to be made by Russia to Germany of £50m. in goods and £300m. in gold, and this from a bankrupt country, where industry was at a standstill. From June 1918 onwards the Bolsheviks were recognised as the declared foes of the Allies; but to bring help to the White armies and to the Czechoslovaks seemed impossible, since all ways into Russia were closed except by the Arctic or the Pacific. These Czechs, now stranded in Russia, had gone there originally to fight against their Austro-Hungarian masters, hoping thus to facilitate the creation of an independent Czechoslovak state.

British Expedition to North Russia. In Feb. and Mar. 1918 the British had effected a landing at Murmansk, at the head of the Kola Inlet, and at Pechenga, the nearest Russian port to the Finnish frontier. The arrival of Fr. and Amer. cruisers made the occupation international. The local Soviet worked with the Allies, and this landing was in fact approved by Trotsky. Then came the Ger. alliance with Finland, who was promised all the ter. lying between her E. borders and the White Sea. To meet this threat Allied reinforcements arrived in June, under Gen. Poole. Presently the Bolsheviks changed their policy and demanded the departure of all Allied forces from Russia. This demand was refused by the Murman provisional gov., which threw in its lot with the Allies. For 3 months there followed attacks from the Finnish borders which were beaten off by Allied troops assisted by local levies, until Finland finally gave up her desire for conquest and Germany was too fully occupied elsewhere. The isolation of the Murman coast deprived the occupation there of much of its strategic importance, and therefore on 2 Aug. Gen. Poole, by a surprise attack, occupied Archangel. In Archangel there were immense quantities of war material sent by the Allies to Russia, which the Bolshevik Gov. was now commandeering and selling to the Germans, and the Bolsheviks had imposed their gov. by force on the prov., which was in a starving and desperate condition. The Allies therefore undertook to feed the

people, prevent the disposal of the war material to Germany, and estab. a free local gov.; they then attempted to push southward to join hands with the right wing of the Czechoslovaks W. of the Ural Mts. But the Allied troops were far too few and failed to join the Czechs.

The Czechoslovak Armies in Siberia. In Siberia the situation was more hopeful, but also more complicated. There were some 120,000 Czechoslovak troops, some at Vladivostok and some on the W. borders of Siberia, while between them lay the Trans-Siberian Railway, held in places by Bolsheviks and Austro-Ger. prisoners. There were a number of scattered Russian 'white' troops, some in the Far E., some at points along the line, and a considerable number under Alexiev in the Don and Kuban provs., but separated by a wedge of Bolshevik forces from the westernmost Czechoslovaks. The Allied policy vacillated as at Archangel, and in the same way the forces finally sent to the E. were too few to be effective. Japan was willing to intervene in E. Siberia, but was not interested in the W. developments, while America refused to be drawn into the adventure at all except under the most stringent conditions. From first to last the Czechs had to bear the brunt of the contest themselves, and throughout the summer abortive discussions continued among the Allies. On 3 Aug. a Brit. contingent reached Vladivostok to find the Czechoslovaks hard pressed. On 12 Aug. a Jap. contingent followed, while Fr. troops had already arrived, and Americans appeared on the 16th. By 5 Sept. the Czechs with this Allied assistance had cleared the lines of the railway for the whole distance from Vladivostok to the Volga. But the smallness of the numbers of the Allied troops and the continual difficulties with the various local govts. rendered impossible any rapid movement to the help of the Czechoslovaks on the Volga.

OPERATIONS IN THE CAUCASUS, 1917-18. Meanwhile, in the Caucasus, after the revolution of Mar. 1917, a Transcaucasian Gov. had been proclaimed under the influence of the people of Georgia. There was anarchy among the Russian troops in the Caucasus, and Prjevalsky, who had succeeded Yudenitch, was compelled to ask Turkey for an armistice. The advance of the Turks began to weaken the allegiance of the Tatars to the new gov., and in Mar. 1918 came the Brest-Litovsk treaty making over Batum, Kars, and Ardahan to Turkey. Later Turkey increased her demands, and at a conference held at Batum in May the Georgian delegates refused to accept them. The Transcaucasian Gov. had ceased to exist and an independent rep. of Erivan was proclaimed for the Armenians, under Turkish protection, and Georgia was compelled to appeal to Germany. Germany was determined to keep control of the Baku oilfields, and therefore decided to use the Georgians as her instruments to this end. Gen. Kress von Kressenstein was recalled from Syria and sent to the Caucasus, and Ger. troops were marched

into Georgia. At a conference at Constantinople in July an attempt was made to settle Germany's differences with her ally, and the Turks were informed that they must abide by the Brest-Litovsk treaty. The Turks ignored this note and continued their advance towards Baku. The rift between Germany and her ally was widening. These events directly interested Britain, for not only did they prejudice the Brit. Mesopotamian campaign, but also the whole future of Persia and the immediate hinterland of India. Events E. of the Caspian were equally disquieting. After nearly a year of contest the soviet of Tashkent had ousted the provisional gov. of Kokhand, and in May Russian Turkestan had been declared a soviet rep. The nearest Brit. troops were the small contingents in Persia and Marshall's Army in Mesopotamia, and their problem was to keep the road from Bagdad to the Caspian open against Turkish attacks from the W. and to check the advance of the Transcaspien Bolsheviks. It was evident, too, that if the E. front were to be restored the Caspian and its shipping must be controlled, which meant that Baku must be held against the Turks. A Brit. force was sent to Transcaspien and after many difficulties succeeded in inflicting a severe defeat on the Bolsheviks. This remote operation had really great political importance for Britain, since the railway from Merv to Kushk ended within 2 days' ride of Herat, the key to Afghanistan. In Baku itself the Bolshevik Gov. was overthrown on the night of 25 July, and the new gov. asked for Brit. assistance. They had control, for the moment, of the shipping on the Caspian and sent transports to Enzeli to fetch the small Brit. force under Maj.-Gen. Dunsterville, which was now more than 1000 m. from its base and had to depend for assistance on the local levies, Armenian and Russian, the former of whom refused to fight on 17 Aug., and soon afterwards went home. Unexpected help, however, came to Dunsterville from the Russian leader, Bicharov, who took Petrovsk on the Caspian 200 m. to the N., and sent help to Baku. After a serious rearguard action the British evacuated Baku and reached Enzeli.

TURKS DEFEATED IN MESOPOTAMIA AND PALESTINE. Marshall in Mesopotamia spent the summer in consolidating his position, and when he advanced on the Tigris in Oct. it was against a beaten enemy. Although in these confused operations the Allies had failed to recreate the E. front except in isolated parts, they had upset Germany's forecast of events, and it was left to Allenby in his Palestine and Syrian campaign to drive the Turks out of the War, with the resultant collapse of all Germany's E. dreams. On 19 Sept. his troops drove back the main Turkish forces, while his cavalry burst through to the right and then, wheeling, cut off the retreat of nearly the whole of the Turkish forces. By the 25th, co-operating with the Arab forces of the Emir Faisal on the E., Allenby had rounded the Lake of Galilee, the number

of his prisoners reaching 45,000. Damascus fell on the 30th, and the Fr. troops co-operating with Allenby took Beirut on 7 Oct., while the British took Sidon. On 26 Oct. Aleppo fell, and on the 28th Allenby's troops reached Muslimieh, the junction on the Bagdad railway, which was regarded as the nodal point in the Ger. hold on the E. Marshall's advance up the Tigris and his occupation of Mosul now compelled the Turkish Army there to surrender, and on 30 Oct., an armistice was signed. The Allies were now in a position to occupy the forts on the Dardanelles and the Bosphorus and to make free use of the straits.

COLLAPSE OF BULGARIA. Meanwhile in the Balkans events began to move towards the final collapse of Bulgaria. The Allied front in the Balkans had been quiescent since the futile offensive of May 1917, and various adjustments had taken place, the new Gk Army replacing many of the Fr. and Brit. troops, now representing the largest Allied contingent. In June Gen. Franchet d'Esperey succeeded Guillaumat as commander-in-chief. The morale of the Bulgarian troops had begun to fall and desertions were frequent, while King Ferdinand of Bulgaria himself, realising that defeat was imminent, was seeking a way out of his difficulties. During July the French and Italians moved forward, but were repulsed by counter-attacks. There was a lull until the middle of Sept., when the Allies launched a great attack in which the Serbian troops played a notable part. By 22 Sept. the Bulgarians had fallen back from the Doiran front closely pursued by the British and the Greeks. On the 24th Fr. troops entered Pripel, capturing huge quantities of stores. By the evening of the 25th the Serbians had taken the Babuna Pass and the tn of Ishtip; they were close to Veles, and Uskub was almost within their grasp. The Bulgarian front was cut in two, and on 30 Sept. an armistice was signed at Salonika. Meanwhile the Allied armies had been sweeping forward. On the 27th the British took Strumnitza and the Serbians captured Veles, while on the 30th Fr. cavalry entered Uskub. On 4 Oct. Ferdinand abdicated in favour of his son Boris, and retired to Hungary. The Allies advanced to the Danube. On 12 Oct. the Serbians entered Nish, and by the end of the month they were in Belgrade.

DISINTEGRATION OF AUSTRIA-HUNGARY. *Austrian Defeat on the Piave.* These events were the deathblow to the already disintegrating Austro-Hungarian Empire. In the last week of Oct. Count Andrássy, who had taken Burian's place as foreign minister, made a journey to Switzerland to attempt to negotiate with the Allies, but found no approach possible. But the Austrian Army in Italy was still in being, and until that Army was put out of action the Empire remained. Gen. Diaz, the It. commander-in-chief, had now under his command contingents from almost all the chief Allied countries. Diaz aimed at driving a wedge between the Austrian forces in the mts and those in

the plain, after which he could deal with each section separately. The first step was the crossing of the Piave, now in flood, and presenting especial difficulty opposite the It. Tenth Army, commanded by the Brit. gen., Lord Cavan. The riv. here was 1½ m. broad, with innumerable rapid streams between many is., the largest of which was called the Grave di Papadopoli, some 3 m. long. On the night of 23 Oct. the British effected a footing on the is. and held the position for 2 days until on the 25th they were joined by other It. and Brit. troops, and were then able to begin the bridging of the main channel. Meanwhile the Italians had been fighting a costly holding battle on the Grappa, which the Austrians intended as the main attack to distract attention from the Piave, which they believed the flood had made safe. On the 27th the Tenth Army attacked and gained sev. positions on the E. shore of the Piave. Severe fighting continued until the night of the 28th, but on the 29th Cavan (q.v.) moved steadily forward; on that day the Austrians were in full retreat. By the 30th Diaz had driven a wedge securely between the 2 halves of the Austrian front. From this stage the retreat became a rout. On the 31st the collapse was complete, and Czech and Polish battalions surrendered *en masse*. On 1 Nov. the Grappa front gave way. On the 4th the Brit. forces had crossed the Tagliamento, and by the evening of that day the Sixth Army was far over the watershed and in the outskirts of Trento itself. The Austrian armies had collapsed, and left in the Allies' hands more than 300,000 prisoners and 5000 guns.

Armistice with Austria-Hungary. On 4 Nov. an armistice came into effect and hostilities ceased. On the evening of 3 Nov. a detachment of Bersaglieri landed at Trieste, and the city passed into It. control. Thus all Germany's allies were finally beaten. The Piave disaster precipitated the collapse of the Austro-Hungarian Empire. On 18 Oct. Czechoslovakia had proclaimed her independence; now other Slav states within the Empire followed suit, and on 13 Nov. Austria became a rep.

CASUALTIES. The exact total of the casualties sustained during the War will never be accurately known. Some countries kept only approximate or imperfect statistics. The total killed among the military pop. of both sides has been estimated to exceed 10,000,000. Total killed in the Brit. Empire (including Ireland and India) was 1,089,900; France, 1,393,388; Russia (approximately), 1,700,000; Italy, 460,000; Rumania, 335,076; and the U.S.A., 115,660. Total number killed among the Central Powers was: Germany, 2,050,466; Austria-Hungary, 1,200,000; Bulgaria, 101,274; Turkey, 300,000.

THE EFFECTS OF THE FIRST WORLD WAR. The War exceeded, in the scale of its operations, the number of its casualties, and the total of its costs, any previous known human conflict. While the main battleground had been in Europe and Asia Minor, it had involved the peoples

of every continent. It was a global war. It occasioned the collapse of sev. great empires, some of which, like the Ger., were of comparatively recent foundation, others, like the Russian, had been built up through the cents., and, with the emergence of a number of small Central European states after 1918, completely altered the map of Europe and Asia Minor. Its cost, in men and material, was particularly heavy in France and Germany. A burden of reparations was laid on Germany which could never be fully repaid and which, even if partially repaid, would have upset the world economy. The struggle had tended to exalt the power of the military leaders: this was particularly apparent among the Central Powers, but even in England, where parliamentarianism existed as a strong check, there was frequent friction between civil and military depts.

The war was so colossal in its scale that it gave impulse to new ideas, new inventions, new political and social conceptions, so that the world of 1918 emerged in nearly every sense entirely different from that of 1914. In England it did much to further the enfranchisement of women, and to increase the influence of the working-class. In Russia it made possible the successful Bolshevik revolution. The war, unlike previous struggles, involved everyone. Not only did the scale of the military operations make homeless, temporarily or permanently, thousands of civilians, but submarine and aerial warfare ensured that non-combatants and even neutrals far behind the fighting lines might be involved. Results showed that wars could be successfully prosecuted by great armies whose members were, in the main, volunteers or conscripts, hastily trained. The war demonstrated the capacity of endurance of soldiers and civilians alike, and showed that nations could sustain hitherto unprecedented losses, and yet avoid total defeat. The immensity of the destruction, both material and moral, and the sudden transformation of society indirectly caused by it, produced a Europe without the sense of stability and belief in progress which had been characteristic of the Europe of the late 19th cent., while the telling material contribution made in 1917-18 by the U.S.A. to the Allied cause marked the emergence of the U.S.A. as a major world power.

PEACE TREATIES. Treaty of Versailles, signed by the Allies and Germany 29 June 1919, and ratified at Paris 10 Jan. 1920; Treaty of St Germain-en-Laye between the Allies and Austria, signed 10 Sept. 1919, and ratified in Paris, 16 July 1920; Treaty of Trianon, between the Allies and Hungary, signed 4 June 1920; Treaty of Neuilly, between the Allies and Bulgarians, signed 27 Nov. 1919, ratified in Paris, 9 Aug. 1920; Treaty of Sèvres, between the Allies and Turkey, signed 10 Aug. 1920, but never ratified; Treaty of Lausanne, between the Allies and Turkey, signed 24 July 1923, and ratified in the same year. (See under the names of the treaties.)

See also AFRICA, GERMAN EAST, FIRST WORLD WAR, CAMPAIGN IN; AISNE, BATTLE OF THE; ARAS, BATTLE OF; CASUALTIES IN THE FIRST WORLD WAR; EGYPT, FIRST WORLD WAR CAMPAIGN IN; FRANCE AND FLANDERS, FIRST WORLD WAR CAMPAIGN IN; GALLIPOLI CAMPAIGN; MACEDONIAN FRONT; MARNE, BATTLES OF THE; SOMME BATTLES; YPRES, BATTLES OF.

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World War, Second (1939-1945). BEGINNING OF THE WAR IN EUROPE. Causes. The Second World War began on 1 Sept. 1939, with Germany's attack on Poland, followed 2 days later by declarations of war on Germany by Great Britain and France, both having given pledges to Poland. The prin. cause, however, was the aggressive policy of the Ger. National Socialist Gov., which itself had its origins in the rise of Hitler to the post of chancellor, the repudiation of the Locarno Treaties, and the rearmament of Germany. For some 7 or 8 years before the outbreak of war between Germany and the Allies the Nazi Gov. had subordinated the entire social and internal political life of Germany to the creation of a vast war-machine, which, as it approached completion, enabled Hitler to occupy Austria in Mar. 1938, and Czechoslovakia a year later, both effected without resistance. In the same month the Memel ter. was incorporated in the Reich, and Italy invaded Albania 16 Mar. and in a few days reduced it to subjection.

The milestones along the road of Germany's military and aggressive renaissance were plain for all to see, and there were not wanting a number of warning voices in Britain. Time and again in the period of his exclusion from office Winston Churchill (q.v.) painted in memorable language the picture of Germany's terrible military preparations; but Ramsay MacDonald preferred to follow the *ignis fatuus* of Geneva protocols and international treaties of 'mutual guarantee and assistance' and all the circuitous unrealities of the Covenant of the League of Nations; Mr (later Earl) Baldwin was deceived on the facts of Ger. rearmament and chose to regard Churchill as an alarmist; and Neville Chamberlain preferred the policy of 'appeasement.' Yet none of these statesmen is to be entirely blamed for faults of omission which were at the least merely the political reflection of the popular attitude, not only in Britain but, still more, in France, where the people were weakened by a most pronounced swing to the 'Left' in politics and also by their belief in the absolute physical protection afforded by the Maginot Line.

From about 1937 Britain gradually awoke to the fact that she must rearm; but the rate of her rearmament was so

slow that she found herself at war with Germany without having made up much of the leeway, and actually facing the disaster of a formidable invasion while still farther behind Germany in the rate of rearmament, before calling upon Churchill to assume the reins of power and pursue an energetic policy more calculated to match the fearful menace which now threatened the Brit. Is. It is matter for historical speculation how far the rearmament and will-to-war of the Ger. people grew out of a determination to avenge their humiliating defeat in 1918 and to nullify the fancied injustices of the treaty of Versailles, or, on the other hand, whether this process was largely unconscious. In the mind of the Ger. leader the pattern and scope of his mission to restore the Ger. Empire, to enlarge its confines beyond limit and to acquire Colonial possessions (see COLONIAL QUESTION), were clearly enough conceived, but it is probably also true to say that the Ger. people were by no means so politically conscious as to give practical expression to a policy which, in its gradual realisation, spelt not only privation but the loss of such small measure of social liberty as was commonly extended to the nation. In short, the demagogue Hitler, himself a neurotic and emotional subject, played on the self-same characteristics of his fellow-countrymen, beginning with the negative policy of persecuting the Jews.

This policy was effective in eliminating from the Ger. body politic all such elements of Socialist weakness as might have flowed from a sense of inferiority, besides placing large funds in the hands of the Nazi party with which to organize the *Reichswehr*, the nucleus of the great army it was proposed to build up. In this process of welding a totalitarian machine, Hitler found congenial and often very able coadjutors in Goering (q.v.), who organised the Ger. Air Force; Goebbels (q.v.), who built up a formidable ministry of propaganda; Streicher (q.v.), who carried out the Jewish pogroms; and Himmler (q.v.), who developed the Secret State Police (Gestapo), the symbol of the Nazi spirit. Hitler's dream of *Weltmacht*, however, depended on swift execution, and as soon as his plans were matured he began to use his war machine with ruthless celerity and with an utter disregard for any and every pledge he had given in the past.

The political situation in Europe up to the Ger. occupation of Czechoslovakia is dealt with in the article CZECHOSLOVAKIA. After the seizure of Czechoslovakia the European situation rapidly deteriorated, for it was evident that the Ger. action was in complete disregard of the principles laid down by the Ger. Gov. itself in the Munich agreement between Hitler, Chamberlain, Daladier, and Mussolini. (See CZECHOSLOVAKIA and MUNICH PACT.) On 31 Mar. Chamberlain announced the assurance of Brit. and Fr. support to Poland 'in the event of any action which clearly threatened Polish Independence, and which the Polish Gov. accordingly considered it vital to resist' (an Agreement of Mutual Assistance was signed with

Poland on 25 Aug.). Prior to this, Hitler, in April, had denounced the Anglo-Ger. Naval Agreements on the pretext that Great Britain and other Powers were pursuing a policy of 'encircling' Germany. Chamberlain had now abandoned his policy of appeasement, and Britain began to rearm in earnest. A ministry of supply was formed and a Conscription Bill passed. Abroad, the Brit. Gov. gave unilateral guarantees to Rumania and Greece, and concluded a treaty with Turkey for mutual assistance. On 23 May 1939 a treaty of military alliance was concluded between Germany and Italy. From the menacing note in Hitler's oratory it was becoming clear that the next attack was to be on Poland, a country to which it would be geographically impossible for Great Britain and France to send direct help; hence an attempt was made to bring Russia into the 'peace front', a front which the Nazi Gov. always distorted into the fiction of encirclement, and negotiations with this object went on in Moscow during most of the summer. Meanwhile the Nazi leaders launched a furious campaign of threats and propaganda, demanding that Poland yield up Danzig as a Free City within the framework of the Reich and that Germany should receive a route and railway with extra-territorial status through the Polish Corridor (q.v.) in exchange for a 25-year pact of non-aggression and a recognition of the existing Ger.-Polish boundaries as 'ultimate.' There is little doubt that Hitler was convinced that Great Britain would never fight over Danzig.

The most startling development in the international situation after this was the announcement that Ribbentrop (q.v.), foreign minister, had gone to Moscow to sign a non-aggression pact with the Soviet Gov. Chamberlain sent a personal letter to Hitler stating that 'whatever might prove to be the nature of the Ger.-Soviet Agreement, it could not alter Great Britain's obligation.' If its more specific provisions were kept secret, events soon revealed that Stalin and Hitler had in effect concluded a bargain whereby Russia was to have the Baltic States, and that Poland should be partitioned between them. Still later, Germany acquiesced in the Russian seizure of part of Finland.

The Ger. reply to the letter was given to the Brit. ambas. on 23 Aug. Hitler stated that the Brit. promise to assist Poland would make no difference to the determination of the Reich to safeguard Ger. interests, and that the precautionary Brit. military measures announced in the Prime Minister's letter of 22 Aug. would be followed by the mobilisation of the Ger. forces. In order to gain a strategic advantage over Poland, Hitler resorted to a characteristic piece of diplomatic jugglery. Having refused to guarantee a negotiated settlement with Poland on the ground that 'Polish provocation might at any moment render German intervention to protect German nationals inevitable' (25 Aug.), 4 days later he told Henderson that he was prepared to accept the Brit. proposal for direct

Ger.-Polish negotiations, but counted on the arrival of a Polish plenipotentiary by 30 Aug., to which the Brit. ambas. retorted that the Ger. answer 'sounded like an ultimatum.' In short, without giving the Polish Gov. the slightest opportunity of making contact with Berlin, the Ger. Gov. then broadcast their 'proposals' together with the statement that they regarded them as having been rejected. The proposals had in fact never been communicated to the Polish Gov., and all means of communication between the Polish ambas. in Berlin and the Polish Gov. had been cut off. On 1 Sept. Forster, the Ger. nominee in Danzig, announced in a proclamation to the people of Danzig the reunification of Danzig with the Reich, and on the same day the Ger. armies invaded Poland. Two days later Chamberlain announced in the House of Commons that Great Britain was at war with Germany. France declared war simultaneously. The invasion of Poland, therefore, was the immediate cause of the war between the Allies and Germany.

The general aim of National Socialist Germany was now plainly discernible over many years. That aim was simply and solely the renewal of Ger. imperialism along its previous lines, and the reversal of the Ger. defeat of 1918. The whole purpose of Nazi terrorism was to make the nation internally strong for war, inasmuch as in the Nazi theory the disaster of 1918 was due solely to faulty leadership and to the disintegrating influence of Jews and Socialists. Hence the forcible removal of all potential opponents and the subjection of the nation to a rigid discipline. Ger. imperialism now appeared under the banner of 'Lebensraum' (see further 'MEIN KAMPF'), but its objects were much the same as under the Empire—European hegemony, and later, *Weltmacht* or world domination.

German Invasion of Poland. The Ger. invasion of Poland was Europe's first experience of the *Blitzkrieg* methods, and in addition Poland tried to defend her strategically indefensible W. border. Warsaw was bombed by over 2000 Ger. aircraft; the W. half of the country was overrun by 54 Ger. divs., against which the Poles could oppose only 22 divs. of infantry and 7 brigades of cavalry. They had only 2 tank brigades, few anti-aircraft or anti-tank guns, no armour, and only a horse-drawn supply service. Germany had 7 armoured and 7 motorised divs. Against Germany's 2000 aircraft Poland had 350; and the bombing of Polish airfields, before any actual invasion, destroyed the Polish machines on the ground. In a very short time the Germans obtained complete mastery of the air, which enabled them to destroy communications and very soon to reduce the Polish Army to a mob of disconnected units. The Polish Gov. then left Warsaw and the remnants of the army tried to hold a line on the riv. covering the cap. But a further complication was introduced by the invasion forces of Russia acting evidently under the new Ger.-

Soviet Treaty. Attacked simultaneously in front and in rear, a speedy Polish collapse was inevitable. The Polish Gov. crossed into Rumania on 17 Sept. Warsaw was bombed into surrender, and the partition of the unhappy country soon followed, together with the beginning of the Ger. exploitation and dispersal of the Polish nation.

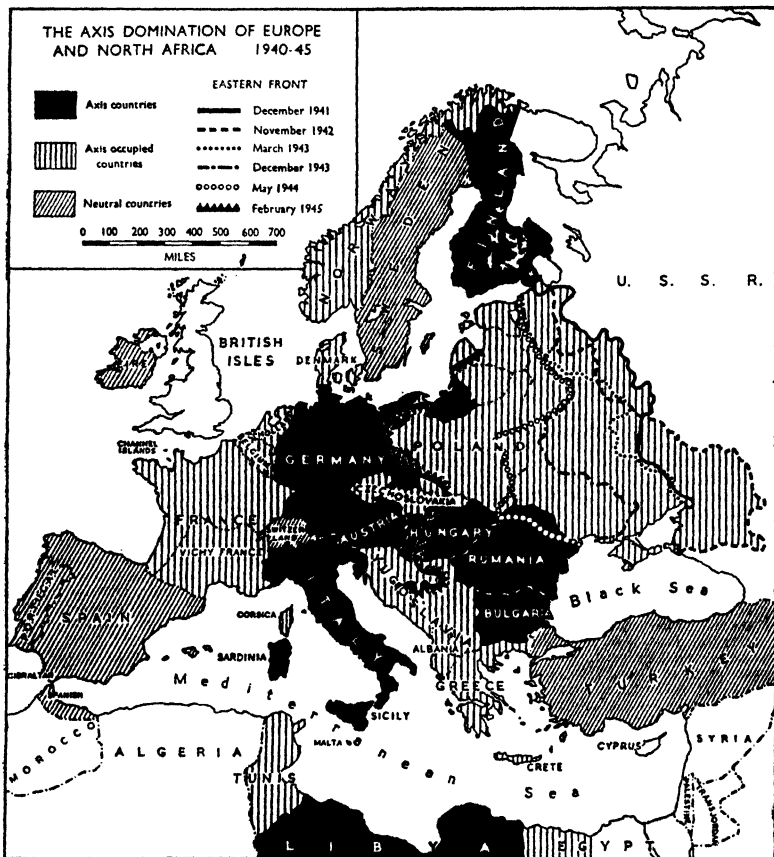
U-Boat Warfare Begins, Sept.-Oct. 1939. Immediately on the outbreak of war Canada, Australia, New Zealand, and S. Africa ranged themselves beside Great Britain. Among the Commonwealth countries, only Eire remained neutral. In the 6 months following the collapse of Poland the only serious fighting occurred at sea, where the Germans began U-boat warfare on the day war was declared and on 4 Sept. sank the liner *Athenia* without warning. On 17 Sept. a U-boat sank the aircraft carrier *Courageous*, while on 14 Oct. another U-boat penetrated Scapa Flow and sank the battleship *Royal Oak* at her anchorage. On the outbreak of war, Churchill, who had been excluded from office since 1929, was appointed First Lord of the Admiralty. The most conspicuous success of the Allies at sea at this date was the battle of the R. Plate and the enforced scuttling of the Ger. pocket battleship *Admiral Graf Spee*, and the fitting of ships with 'de-gaussing' girdles which rendered the Ger. magnetic mines almost ineffective.

British Expeditionary Force in France, 1939. Meanwhile the Brit. Expeditionary Force (B.E.F.) under Lord Gort (q.v.), was sent to the aid of the Fr. Army under Gamelin (q.v.), and took over a section of the Franco-Belgian frontier with Arras as H.Q. and spent the winter in fortifying a position N. of the defences of the Maginot Line. The B.E.F. comprised by winter only 3 corps of 3 divs. each, together with a Fighter Wing and a Bomber-Reconnaissance Wing and an independent Advanced Air Striking Force. During the Polish invasion the Fr. forces made desultory attacks on the Ger. 'West Wall' (q.v.), notably around Saarbrücken; but generally speaking, the W. Front was quiescent throughout the winter. Thus, apart from the bombing of naval objectives on either side, nothing happened on the W. Front before the spring of 1940, a period of inactivity which earned the satiric description of 'the phoney war'.

Russian Invasion of Finland. German Invasion of Denmark and Norway. Nov. 1939-April 1940. After the partition of Poland, Russia sought to implement the secret clauses of the pact with Hitler by obtaining possession of the Baltic States. Finland, however, refused to submit, and on 30 Nov. the Russians invaded that country. In the opening stages the Finns prevailed against their mighty neighbour, and it seemed at one time as if the British and French might render aid to Finland, contingently on securing Scandinavian support generally. This support, however, was not forthcoming, and in the result Russia's overwhelming forces prevailed and Finland, by the treaty of Moscow (13 Mar. 1940), yielded to Russian

demands, and the small expeditionary force prepared by the Allies was dispersed. Meanwhile, on 16 Feb., the Brit. destroyer *Cossack* rescued 299 Brit. merchant seamen from the Ger. prison ship *Altmark* in Norwegian waters, where, very soon, the world was to be given yet

for it was by the instrumentality of this arm that the Germans safely crossed the Skagerrak despite the presence of the Brit. Home Fleet, which was lying off Bergen. After the withdrawal of the 2 small allied forces, the King of Norway and his gov. settled in Britain, being the first of many



another example of long-prepared Ger. aggression. For on 9 April 1940 Hitler launched his *Blitzkrieg* against Denmark and Norway. (See NORWAY AND DENMARK, GERMAN INVASION OF (1940).) Denmark was overrun without opposition, and the prin. ports and airfields of Norway were captured on the first day. Two small Allied forces sent to Norway were foredoomed. Events outside Norway were destined soon to compel their evacuation. The lesson of air power was again exemplified by the campaign in Norway,

allied gov. to carry on the uphill struggle from that country. Following the brief inglorious Allied campaign in Norway, Churchill replaced Chamberlain as Brit. Prime Minister. The new gov. was joined by the leaders of other political parties. It was no time for disunity, for on the day Churchill assumed the reins of gov. Germany struck at Holland and Belgium. (For details of the campaigns in the Low Countries and France, 1940, see WESTERN FRONT IN THE SECOND WORLD WAR.)

German Invasion of the Low Countries, May 1940. Holland was crushed in a few days. The Belgians appealed for Allied support, and the Fr. and Brit. armies on the Belgian frontier wheeled N.E. to the Dyle, as the Germans intended they should. The Germans used parachutists and 'fifth column' aid; they were soon able to attack Rotterdam and capture the vital Moerdijk bridges in the heart of Holland. The position of the Dutch Army was hopeless after this loss, but their surrender was hastened by the bombing in daylight of the centre of Rotterdam, in which over 900 inhab. were killed, and the centre of the town very heavily damaged. Queen Wilhelmina and her gov., however, succeeded in escaping to London. The defence of Belgium fared no better. The early loss of the bridges over the Albert Canal prejudiced the forward line of the Belgians and the main line, on which were also the Brit. and Fr. troops and which ran through Antwerp, Louvain, and Namur, was soon gravely compromised by the Germans striking at Sedan, the hinge of the allied wheel. Faced by this threat, Gamelin, commander-in-chief of the allied forces, fell back on the line of the Scheldt while Ger. armour was pouring through a gap in the Fr. Ninth Army between Sedan and Mézières where there was no Maginot Line. This irruption separated the B.E.F. and the Fr. N. armies from the rest of the allied forces on the W. Front and the Germans now wheeled again and made a dash for the Channel coast in the direction of Boulogne. The Belgian Army's supplies were gone, and 29 May King Leopold capitulated to the Germans.

Allied Withdrawal to Dunkirk—Germans cross the Seine and Enter Paris—France Capitulates—Mussolini Declares War, May—June 1940. The encircled allied armies withdrew to the Dunkirk beachhead and on 26 May the historic evacuation began. While the evacuation was in progress, Weygand, who had superseded Gamelin, tried to reform the Fr. armies on the Somme-Aisne line; but nothing could stop the onrush of Ger. armour, which crossed the Seine on 10 June near Rouen. In spite of her own desperate position, Britain sent her only 2 formed divs., the 52nd Lowland and 1st Canadian, to France, but they were withdrawn soon afterwards. The 51st Highland Division and 1st Armoured Division were still behind the Somme, forming a part of the Tenth Fr. Army, which was trying to hold the line of the riv. All these Brit. troops put up a gallant defence; their losses in killed and prisoners were extremely heavy. Eventually the remnants of these Brit. forces were evacuated from St Valéry and Le Havre. With France tottering, Mussolini declared war and attacked France from the S. On 14 June the Germans entered Paris. The French Gov. went to Bordeaux, where Reynaud gave place to a Pétain-Weygand Gov. which at once sued for an armistice. On 21 June at Compiègne, Fr. delegates signed the armistice. It is agreed that Hitler's best chance of defeating England

was in these weeks. (On Ger. plans to invade Britain, see GREAT BRITAIN; OPERATION SEALION.)

BRITAIN STANDS ALONE. *The Battle of Britain—French warships engaged by British Fleet: Aug.-Oct. 1940.* Britain now stood alone against the Axis (see AXIS, ROME-BERLIN). The country was without weapons; the equipped troops available for defence numbered hardly more than 1 div.; Spitfires and heavy anti-aircraft guns were scarce before mid-summer. Coastal defences were, however, soon organised, and the Local Defence Volunteers, later called the Home Guard (q.v.), was already being formed. When the Battle of Britain (q.v.) began, the R.A.F. were badly outnumbered, but they made up for this deficiency by the quality of their aircraft and pilots. Between 10 July and the end of Oct., Brit. fighters brought down 1733 Ger. raiders for a loss of 915 Brit. aircraft. The Ger. losses were too much for the Luftwaffe, and daylight raids, the recognised preliminary of the *Blitzkrieg*, were abandoned for night raids, for which the Germans now had more trained night-bombers, and during the following year London, Coventry, Hull, Plymouth, Southampton, and other big towns were severely damaged.

The surrender of France created fresh problems for Britain. Only de Gaulle (q.v.) and the small band of 'Free Frenchmen' decided to fight on from Britain. Most urgent of the problems was that of the Fr. warships in Brit., Egyptian, and Fr. N. African ports. Those in Brit. ports and at Alexandria were immobilised and those at Oran and Dakar (q.v.) were disabled by units of the Brit. Fleet. Hitler could now draw his submarine blockade tighter, for he was in possession of all the ports of W. Europe from the N. Cape to the Pyrenees. The R.N.'s efforts to break it met with varying success in this and the ensuing years, but they never failed (see NAVAL OPERATIONS IN SECOND WORLD WAR); the menace of a new magnetic mine was quickly overcome, and the estab. of enemy naval and air bases across the Allied traffic lanes was prevented by the Brit. occupation of Iceland and the Faroes.

The Lesson of Sea Power—The Berlin Pact, Sept. 1940. Hitler had supreme confidence in the superiority of armies over sea-power. Hence even if Britain was still undefeated and receiving material aid from another great sea-power, America, he thought that time was on his side and that, provided Germany and Italy could overwhelm continental Europe and the Middle E. (q.v.), their supplies of raw materials, being independent of sea transport, were assured and they could turn round at leisure and overwhelm the W. democracies. Meanwhile, Hitler openly favoured Japan and, while not yet ostensibly turning his back on Russia, was plotting an invasion. The Ten Year Mutual Assistance Pact was signed in Berlin on 27 Sept. 1940 by Germany, Italy, and Japan, the last-named thereby entering the Axis. By recognising Japan's

leadership of the 'New Order' in E. Asia as a *quid pro quo* for Japan's recognition of the leadership of Germany and Italy of a New Order (q.v.) in Europe the Axis was pursuing a long-range policy against both America and Russia. Moscow had (Jan.-Mar. 1941) been warned by the Amer. Gov. that it was Hitler's intention to invade Russia, but the Russian Gov. cautiously declared that the Berlin Pact did not affect the relations of Russia with any of the signatories and that the Russo-Ger. Pact of 1939 remained unchanged. Meanwhile the chief military operations were in the Mediterranean, where the defection of France and the treacherous policy of Mussolini placed Britain in a most awkward situation.

Fighting in North Africa, Dec. 1940-Aug. 1941. Mussolini, confident that the Axis had virtually won the war, had declared war on both Britain and France. Its troops, numbering 300,000, led by Graziani (q.v.) crossed the Egyptian frontier, but were harassed by Brit. patrols and eventually held at Sidi Barrani, until on 9 Dec. Gen. Wavell (q.v.), reinforced by Indians, Australians, and New Zealanders, made the first of 3 great thrusts in the W. Desert. He drove the Italians not only out of Egypt but out of Cyrenaica. His subsequent retreat was not due to any fault of strategy. Two drafts upon his small army weakened him. The first was for Greece, against which country Mussolini, using Albania as a base, had launched an invasion in Oct.; and the second was for the brilliant campaign of Nov. 1940 to June 1941 against the Duke of Aosta which destroyed Mussolini's E. African Empire and freed Abyssinia. While the W. Desert Force was thus weakened, the It. troops of Graziani were reinforced by Ger. troops and Ger. aircraft based on Sicily. Wavell could not resist the counter-thrust, and was driven back again to the Egyptian frontier (April 1941). He left behind a force that held Tobruk until Gen. Auchinleck (q.v.), who succeeded him, made his attack in Nov. 1941. That, too, was brilliantly executed, but it failed, as Wavell's thrust had failed, before El Aghella. Retreating from El Aghella, Auchinleck stood for 4 months at Gazala; but Rommel (q.v.), creator of the Ger. Afrika Korps, mustering greater strength, overran the position, captured Tobruk, and drove him back to El Alamein (May-Aug. 1942). (See AFRICA, NORTH, SECOND WORLD WAR, CAMPAIGNS IN.)

Italian Invasion of Greece—Italian Fleet Crippled at Taranto: Oct. 1940-June 1941. Reverting to events in 1940, the Greeks offered a most spirited and effective resistance to the It. invaders. But Hitler helped his It. ally in the Balkans as well as in Africa. He secured the aid of Rumania and Bulgaria. The Greeks appealed to Britain, who sent an expeditionary force made up partly of troops from Gen. Wavell's army. Here again, however, in the Mediterranean sea-power made its influence felt when on 11 Nov. 1940 Adm. Cunningham (q.v.)

dealt brilliantly with the It. Fleet at Taranto, half the enemy's battle fleet being torpedoed by Brit. naval aircraft. This remarkable victory at one blow restored for a time naval supremacy in the Mediterranean to the Brit. fleet. It was sea-power again which enabled the Brit. transports to land troops in Greece and to evacuate them. The Brit. force in Greece was no more than a token, comprising 1 Australian and 1 New Zealand infantry div. and a Brit. armoured brigade, and the Allies were soon defeated by the overwhelmingly superior Ger. forces. The Germans, advancing S., called upon Yugoslavia to align herself with the Axis, but the Yugoslavs continued resistance under Mihailović (q.v.) and Tito (q.v.) and eventually triumphed. The defeat of the Graeco-Brit. forces was partly relieved by the brilliant night victory of Adm. Cunningham off Cape Matapan (q.v.) on 28 Mar. 1941; but, though this victory over the It. Navy and that at Taranto enabled the troops to be ferried to Crete, Ger. aircraft inflicted heavy losses on Brit. destroyers, artillery, and transport. The Brit. forces then tried to hold Crete, but fared no better there than in Greece, and they were evacuated, with severe losses in men and material, in June 1941. See further CRETE, THE BATTLE OF; GREECE, SECOND WORLD WAR CAMPAIGN IN (1941).

American Lend-Lease, Mar. 1941. In 1939 America's attitude was so strictly neutral that there was a law on the statute book prohibiting the sale of arms to any belligerent. From this isolationist position, however, the country, under Roosevelt's lead, gradually moved into that of 'the arsenal of democracy,' and the embargo gave place to a 'cash and carry system.' In Sept. 1940 America transferred to Britain 50 destroyers in exchange for the lease of certain naval air bases. In Mar. 1941 the Lend-Lease Bill became law (see LEND-LEASE).

British Action in Syria and Iraq, April-July 1941. Britain now had a third enemy in the shape of Vichy France. (See FRANCE, HISTORY; PÉTAIN, HENRI.) Pétain's Gov. allowed Germany the use of her airfields in Syria for the support of a rising in Iraq (q.v.); and when, after its suppression, Brit. and Free Fr. troops entered Syria to prevent other like action, Vichy ordered the troops in the country to resist. They were overcome, however, and Syria passed into the control of the Free French (July 1941).

THE CONFLICT BECOMES WORLD-WIDE, *Bismarck Sunk—Hitler Invades Russia: May-June 1941.* In the Atlantic Germany's last attempt to support her submarine campaign by the use of commerce raiders was crushed by the sinking of the *Bismarck* (q.v.) on 27 May. This notable defeat emphasised Germany's need to make much more use of her armies if she hoped to avoid the stranglehold of Brit. sea-power. Though a great pincer movement through Turkey and N. Africa with the Middle E. oilfields as the objective was a possible Ger. plan, Hitler had decided on the invasion of Russia, but

against the soundest military advice. This was eventually launched on 22 June 1941, with the aid also of Hungarian, other Balkan, and Finnish troops. (See EASTERN FRONT, or RUSSO-GERMAN CAMPAIGNS IN SECOND WORLD WAR.)

German Victories in Russia, June-Nov. 1941. The Germans and their satellite troops swept forward to Leningrad (q.v.), which they besieged but never took. Their forces overran the agric. Ukraine and the industrial Don Basin. They came within reach of Moscow itself. These gains were the more impressive from the fact that the Germans for the first time were fighting a Power which was prepared for them, both in mobilised man-power and in mass production. But the Germans were superior in the new tactics and strategy of the *Blitzkrieg*, and this experience might conceivably have prevailed but for Russian tenacity and the Russian climate. The buffer states (the 3 Baltic states, Bessarabia, and E. Poland), which Stalin had hoped would effectively cushion the first shock of the Ger. impact, had been wrenched away from his grasp in fierce battles. The Russians followed a desperate 'scorched earth' policy and fought with extraordinary heroism. Their losses and sufferings were enormous, but they never ceased their dogged resistance. The Germans relied largely on superior armour and on aircraft, and the forces employed on both sides were beyond precedent in the records of warfare. Following their great losses, the Russians had to rely for supplies partly on the war factories of the Urals, to which much plant had been transferred, and partly on lavish shipments from Britain and America, which reached them from Murmansk and from Persia after the deposition of the pro-Nazi Shah Pahlavi in Aug. 1941 by Brit. and Russian forces.

Japan Enters the War—British Battleships Sunk—Fall of Singapore, Dec. 1941–June 1942. The struggle now swiftly developed into a world conflagration. Churchill's broadcast of 22 June had certainly enlisted Amer. sympathy for Russia, but the latter's evident plight also excited Jap. acquisitive instincts. With Vichy's concurrence, Japan had already seized Fr. Indo-China as a jumping-off ground for their projected invasion of Burma and Brit. Malaya. (See PACIFIC CAMPAIGNS, or FAR EASTERN FRONT IN SECOND WORLD WAR.) On 14 Aug., Churchill and President Roosevelt met on the Atlantic in a warship and signed the Atlantic Charter (q.v.), a gesture which irrevocably linked together the fortunes of the 2 great W. democracies. On 7 Dec., while a Jap. mission was negotiating in Washington, Jap. carrier-borne aircraft suddenly bombed Pearl Harbour (q.v.), inflicting serious damage on the Amer. warships there. On the same date Jap. aircraft attacked every Amer. and Brit. E. base within reach. Both Japan and Germany then declared war on America. On 10 Dec. Jap. aircraft torpedoed and sank the Brit. battleships *Prince of Wales* and *Republie*

off the coast of Brit. Malaya, and so deprived Britain of the command of the sea in the E., this painful loss being due to the ships venturing into the Gulf of Siam without fighter escort. Every blow of the Japanese against Brit., Amer., and Dutch bases in the S. Pacific found its mark; allied troops fought heroically but hopelessly. Manila fell on 3 Jan. 1942, and Hong Kong on 25 Dec. 1941. Singapore fell on 15 Feb. 1942, the evacuation of more than a handful was impossible; most of the newly landed troops were captured by the Japanese, who soon invaded and occupied Burma. The virtual elimination of the Brit., Dutch, and Amer. warships in the Java Sea sealed the fate of the Dutch E. Indies. By the spring of 1942 Japan stood on the E. frontier of India and at the gateway of Australia and held the whole semi-circular archipelago between, with the exception of New Guinea S. of the Owen Stanley Range. But Japan's thrust had spent itself, and further expansion westward was thwarted by the Brit. occupation of Madagascar (5 May 1942). Attempts at expansion eastward were smashed in the battles of the Coral Sea (4–8 May), in which the issue was decided in the air, and of Midway Is. (4–6 June) which broke the spearhead of Jap. naval and air striking power.

British Reverses of 1941–2. Britain was outnumbered by the sea, land, and air forces of Japan throughout the Far E. theatre. A further stroke came on 19 Dec. 1941, when the *Valiant* and *Queen Elizabeth* were seriously damaged by It. limpet bombs in the harbour of Alexandria. Thus Britain had no longer any battle squadron in the Mediterranean. The sea defence of the Nile Valley was confined to submarine and defence flotillas, with a few cruisers and shore-based air forces. This necessitated the transfer of Brit. shore-based torpedo-carrying aircraft to the N. African shore, from the S. and SE. coasts of England, where they were soon to be needed, in the escape of the *Scharnhorst* and *Gneisenau* from Brest. It was not felt that the Japanese would derive great advantages by invading Australia in force since thus they would commit themselves to a very formidable campaign at a great distance from home, but Japan certainly had the ability to overrun a large part of India, take Calcutta and Madras, and make 'very cruel air raids upon defenceless Indian cities.' However, if the British were anxious about the sea, the enemy must be anxious about the air, for the great flood of Amer. reinforcements was soon to give the Allies superiority in numbers.

Japanese Invasion of the Southern Pacific and Burma, Jan. 1942–May 1943. Meanwhile the Americans were employing great naval and air forces in the Pacific against Japan. Here Jap. strategy in 1942 was to work from one captured point on the outer is. to another until they had isolated Java, the centre of resistance. They pressed these operations as rapidly as possible here and in the Pacific Is.

farther E., so that an allied naval counter-offensive, whether based on India or Australia, would be confronted by a long chain of is. well supplied with airfields behind which their fleet could await attack. Not satisfied with their impressive conquests throughout 1942, the Japanese extended their flanks westward into Burma and eastward to New Guinea and the Solomons. Invading Burma from Siam, which latter country had declared war on Great Britain and America

troops were steadily forced back, but maintained 'hedgehog' and 'bolt positions' which were intended to serve as springboards for their offensive of the next year. The Germans had sustained a severe shock in the winter before Moscow, but with the thaw they reasserted themselves. The Russians anticipated the Ger. spring offensive by a strong attack in the Kharkov region and a long-drawn-out struggle ensued (May-June 1942), but they lost Sevastopol and the rest of the



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AT THE TURN OF THE TIDE: SOUTH OF EL ALAMEIN, NEAR BIR GABALLA,
20 AUGUST 1942

Lieutenant-General Montgomery points out various features while talking with officers of the 22nd Armoured Brigade. On General Montgomery's right is Lieutenant-General Horrocks, and on his left Brigadier Roberts, of the 22nd Armoured Brigade.

(25 Jan.), they took Moulmein (31 Jan.), crossed the Salween and Sittang rivs., and compelled the British to abandon Rangoon (8 Mar.). The British evacuated Mandalay on 1 May, and a fortnight later trekked into India, weaponless and weary, followed later by Gen. Stilwell's Chinese forces. (See BURMA, SECOND WORLD WAR, CAMPAIGNS IN.)

Moscow Saved—Germans Take Crimea—Siege of Stalingrad: Dec. 1941-Oct. 1942. Meanwhile in Russia, the severe winter of 1941-2 brought a great change. The Germans were no match for the Russians in winter campaigning. Zhukov, issuing from Moscow, raised the siege of the Russian cap, and the Germans were within an ace of repeating the disaster which befell Napoleon in 1812. The Ger.

Crimea early in July, in the great Ger. offensive which began on a 200-m. front towards the Don. By Oct. the Germans appeared to be in the ascendant—their forces closely besieging Stalingrad, and also advancing towards the Malkop oil fields.

THE TURN OF THE TIDE. Battle of El Alamein—Allies Land in North Africa: Nov. 1942-May 1943. It may be said that Nov. 1942 marked the high tide and the turn of Germany's fortunes. Various factors were co-operating to destroy their illusions of world conquest. Thus, while it is true that, when America entered the war, there was an ominous rise in shipping losses due to the operations of U-boats in Amer. waters and that the menace of those terrible losses was felt

throughout 1942; yet in 1943 this threat to Brit. food and other supplies gradually began to be mastered. It was now, too, that Brit. factories were mass-producing bombers which were destined in the ensuing 2 years to play a decisive part in the whole issue of the War, when, in conjunction with Amer. Flying Fortresses (q.v.) and Liberators, the Brit. Lancasters, Halifaxes, and others destroyed Ger. industrial plants and heavily damaged many of the great Ger. cities. The turn of the tide came swiftly. In Aug. 1942 Gen. Montgomery was appointed to the command of the Eighth Army (q.v.), while Gen. Alexander replaced Gen. Auchinleck as commander-in-chief in the Middle East. On 23-24 Oct. 1942 the Eighth Army lunged forward under its new leader in a third thrust. Alexander's move was timed to precede the landings of Brit. and Amer. armies under Gen. Eisenhower (q.v.) at Casablanca, Oran, and Algiers. The thrust hurled Rommel back to E. Mareh on the Tunis-Tripoli frontier, and Montgomery's army met the forces of Eisenhower. The landings in Fr. N. Africa (8 Nov.) constituted the greatest amphibious operation undertaken up to that time. Hitler sent an army under Gen. von Arnim into Tunisia with orders to hold the country as a bridgehead for further operations in Africa. The result was that this, as well as Rommel's famous Afrika Korps, were all routed or taken prisoners by 12 May. On entering Algeria, the Allies made use of Adm. Darlan (q.v.), but he was assassinated soon afterwards. Free Fr. Forces, earning the confidence that was denied them by their fellow-countrymen, helped heroically in clearing N. Africa, particularly in their brilliant action at Bir el Hakim in the W. Desert.

The Casablanca Agreement, Jan. 1943. Churchill and Roosevelt met at Casablanca to formulate terms on which they would accept the surrender of the Axis nations, and they agreed that the surrender must be unconditional. It was decided that this surrender must be that of all 3 Axis nations and not of their dictators, with whom the Allies had previously stated that they would never negotiate. Russia was not represented at this conference in view ostensibly of Stalin's preoccupations in Russia.

Russian Victory at Stalingrad, Nov. 1942-April 1943. Within a fortnight of the Allied landings in N. Africa, Hitler received another tremendous rebuff, in Russia. Stalin's winter offensive, conducted by such gens. as Zhukov, Konev, Petrov, Malinovsky, and others who had now well learned the lessons of modern strategy and tactics with armour and aircraft, compelled the Germans under von Manstein to withdraw from the coveted Caucasus, cut off the Sixth Ger. Army besieging Stalingrad, and completely destroyed it. The Russian counter-offensive, which thus saved the remains of Stalingrad and wiped out the tragic Army of von Paulus, was begun on 19 Nov. Fearing a second great encirclement, the Ger. High Command ordered the Ger.

army in the Caucasus to retreat. Their withdrawal was skilfully executed, but it involved the abandonment of an immense grain-producing region and of the great oilfields. The Russian activity was not wholly absorbed in the S. The Russian capture in Jan. of Velykye Luki, the pivot of the Ger. fronts towards Moscow and Leningrad, was the initial step in the important phase of reducing the Ger. so-called 'hedgehogs', such as the nearest to Moscow, Rzhev, which fell on 3 Mar., and Vyasma, on the Warsaw-Moscow railway, which they took on 12 Mar. Moreover, the surrender of the Ger. Sixth Army at Stalingrad released a great Russian army in the S. which at once had a profound effect on operations in S. Russia, Kursk being taken on 8 Feb., Rostov on 14 Feb., and Kharkov on 16 Feb. The Russians, however, then suffered a temporary reversal of fortune through a premature spring thaw, when they lost Kharkov and most of the Donets Basin to a strong Ger. counter-offensive. This left the Germans, in April, in a favourable position for the resumption of an offensive in due season provided they were not forestalled by the extremely confident Russian gens.

Axis Surrender in Tunisia, May 1943. Axis resistance in N. Africa came to an end on 13 May, when the It. commander-in-chief, Messe, ordered the whole force to surrender. Victory yielded the entire N. African coast, besides liberating Malta from further attacks and enabling Allied bombers to fly under fighter escort from one end of the Mediterranean to the other. Now that the Axis power in the Mediterranean was broken, Allied ships were no longer forced to take the long route round S. Africa.

The Atlantic Battle. Promising as was the situation on land, the menace from the U-boats was still very serious, especially as the Germans could produce the boats much more speedily than the Allies could hunt and sink them. Furthermore, Ger. aircraft from W. France could fly far into the Atlantic to transmit reports to the U-boat packs on the position of the convoys. Finally, radio-location, or radar (q.v.) was available to the Germans through the Vichy Gov. of France, for the secret had been entrusted to France in the early stages of the War. The peril was therefore substantial, but constant and effective attacks were launched by the R.A.F. on U-boat pens; long-range Sunderland and Liberator planes roamed great distances in quest of the enemy craft; and Canadian corvettes, produced in great numbers, were valuable convoy escorts. It appears, however, that the turning-point in this great Atlantic struggle was the use of improved radar apparatus with which both surface ships and aircraft were now equipped, so that they could range over immense areas of the Atlantic. The U-boat packs were then reduced to a large area in the middle of the ocean, but the use of carrier-borne aircraft defeated them and the last phase came in Oct. 1943, when the Allies were allowed by Portugal to make use of bases

in the Azores. Some 60 U-boats were destroyed between Aug. and Oct.

Development of Allied Bomber Raids. The Anglo-Amer. bomber attacks on Ger. industrial centres were an integral factor in Germany's downfall. Their weight and effectiveness, small at first, increased gradually, especially after mid-1942; the first all-Amer. raid in Europe being that of 17 Aug. 1942. In 1942 the bombs were increased in size from 2000 to 8000 lb.; 12,000 lb. were first used only in 1944 while 22,000-lb. bombs were used from Mar. 1945. The remarkable 1000 bomber raids on Cologne, Essen, and Bremen, in May-June 1942 were not repeated because quality of machine and bomb-load and accuracy of bombing were of more importance than mere numbers. In the course of the same year accuracy was much enhanced by the 'pathfinder' system of dropping guiding 'markers.' The Germans had no effective answer to these attacks.

Allied Conquest of Sicily—Collapse of Mussolini's Fascist Government: June-July 1943. The sequel to the Axis defeat in Tunisia was the landing in Sicily 2 months after the surrender at Tunis. The landings in Sicily, with fighter cover from Malta and Pantelleria, were made on the S. and E. coasts on 10 July by the Amer. Seventh and Brit. Eighth Armies, the latter being joined by a Canadian div. The 1st. garrison was 11 It. coastal and field divs., and 2 complete Ger. divs., one of which was armoured. The Germans, and some It. field divs., offered very stubborn resistance, and it was not until 5 Aug. that Catania was taken. The hardest fighting took place around Mt. Etna. Messina fell on 17 Aug., but by an intensive use of flak the Germans succeeded in moving most of their troops across the narrow strait to the It. mainland, and only 7000 were captured; yet total Axis casualties were 165,000. The conquest of Sicily after 4 months of preparation and execution left too little time for the conquest of Italy during the remainder of the campaigning season. But the Allied landing caused the collapse of Mussolini and his Fascist gov., and he resigned (24 July) a fortnight after the invasion began. On 26 July he was put under arrest and replaced by Marshal Badoglio (q.v.), who, as executive head under the king, formed a new gov.

Italian Armistice—Anglo-American Landing at Salerno: Sept.-Dec. 1943. Badoglio openly pledged the continuance of It. support of the Axis, but soon afterwards he was secretly negotiating an armistice with the Allies, which was signed on 3 Sept. 1943 but not pub. until 5 days later. On the 3rd the Brit. Eighth Army crossed from Sicily into Calabria and began a methodical advance up the Peninsula. The It. fleet for the most part succeeded in escaping to Malta and Alexandria. The Germans evacuated Sardinia and were thrown out of Corsica. The It. divs. were, however, for the most part disarmed by the Germans. An airborne descent had been arranged for capturing the airfields round Rome, but the Ger-

mans swiftly seized these before the descent could be made. Hence the Allies were not able to secure fighter protection for landings farther N. from Calabria than Salerno and it was there, on 9 Sept., that the Fifth Army of mixed Brit. and Amer. troops was landed under the command of Gen. Mark Clark. The landing facilitated the northward advance of the Allies, but they were halted in terrible winter weather on the Ortona-Gargigliano line. The Germans, having fallen back methodically, stabilised a very strong line right across a narrow part of the peninsula, which was the more formidable since it was backed by tortuous mt. tracks and rivs. Hopes reposed by the Allies in Crete and the Dodecanese came to nothing, for attacks without air cover were futile; and in the Balkans as a whole the one useful result of the defeat of Italy was that Marshal Tito, now the leader of the Yugoslavs, further developed his remarkable organisation of successful resistance to the Germans. Meanwhile by a daring parachute coup Ger. units rescued the imprisoned Mussolini and took him to Hitler.

Allied Troops Land at Anzio Beachhead, Jan.-June 1944. Operations in Italy were held up by torrential seasonal rains, but on 22 Jan. 1944 Allied troops were landed at the Anzio-Nettuno beachhead, though they failed to cut the Ger. lines of communications and had to hold on for 4 months before they were joined by the main Allied army. In this offensive, opened 12 May, rapid progress was made, and the Allies entered Rome on 4 June and at once continued their dogged advance up the peninsula.

Teheran Conference—Nov.-Dec. 1943. The end of 1943 brought another series of Churchill's visits abroad; at Teheran the exact course of the war was mapped out as to its final phases, culminating in the complete overthrow of Germany and Japan. The dates of this series of conferences were: Cairo, 22-26 Nov.; Teheran, 28 Nov.-1 Dec.; and Cairo, 4-6 Dec.

Russians Seize the Initiative—Kursk-Orel battles: June-Sept. 1943. The Germans, assuming that they could always prevail in summer, launched an elaborately prepared offensive against the Kursk-Orel salient. After some days of heavy fighting the Germans were defeated with huge losses in men and machines. Orel was retaken by the Russians on 4 Aug., and not many days later Kharkov was again recovered. The Russians now altered their whole strategy, from one of dogged but cramped defence to one of all-out attack and drive, and now broadened their offensive: in the Caucasus they took Taganrog on 30 Aug.; from the Kharkov region, they seized Poltava on 23 Sept.; still farther N., near the heart of the whole front, they took the great rail-centre of Bryansk. Smolensk fell to them on 25 Sept.

Battles of Dnieper Bend—Odessa Liberated—Russians Retake the Crimea: Oct. 1943-May 1944. Nothing could now stop the momentum of the remarkable

Russian recovery and forward surge. They took Melitopol on 23 Oct. and proceeded to seal off the Crimea. There was very stiff resistance in the all-important Dnieper Bend, but on 6 Nov. the Russians retook Kiev, and Zhitomir a week later, though Gen. Vatutin had outrun his communications and the position had to be restored by Zhukov, saviour of Moscow. Strenuous and successful efforts were now made by the Russians to improve their whole position in the Leningrad area. In Feb. 1944, following the capture of Nikopol and Krivoi Rog, the Ger. positions in the Dnieper Bend were eliminated. In the ensuing month, Russian armies crossed in succession three rivers of the S., the Bug, the Dniester, and the Pruth. Odessa was liberated on 10 April, but the historic fortress of Sevastopol was not regained until 9 May, by which time the Germans had suffered a loss in the Crimea alone of 110,000 killed or captured.

British Success against U-boats—Möhne and Eder Dams Breached: Sept. 1943–March 1944. The Brit. campaign against U-boats showed increasing success, for by 1943 convoys were losing only 1 ship in 344 as against 1 in 181 in early 1941. Ger. surface ships also fared badly. The *Tirpitz* was heavily damaged by Brit. midjet submarines in Altenfjord (Sept. 1943); the *Scharnhorst* was sunk off the Norwegian coast in Dec. But another very important element in winning the supply battle was Anglo-Amer. bombing policy. Many great Rhineland cities were repeatedly and methodically bombed in the first half of 1943, and the Ruhr (q.v.) never recovered from the persistent onslaughts. Other outstanding events in strategic bombing warfare were the heavy damage inflicted on Hamburg (July 1943), the breaching of the Möhne and Eder dams (18 May 1943), and the bombing of Berlin (q.v.) between Nov. 1943 and Feb. 1944; post-war investigations, however, have since led to criticism of both the extent and value of such attacks. The Amer. aircraft, too, had by now developed a formidable daylight bombing technique.

THE WAR IN THE PACIFIC AND BURMA.
Japanese Capture New Guinea—Americans Retake Guadalcanal: Jan. 1942–Feb. 1943. In the SW. Pacific the Japanese captured Rabaul (22 Jan. 1942), which became their advanced base here, and landed in the Solomons (23 Jan.) and New Guinea (8 Mar.). The first of sev. destructive air raids on Port Darwin (19 Feb.) increased Australian anxiety, which, however, was allayed by the appointment of Gen. MacArthur (q.v.) as Allied supreme commander in the SW. Pacific. A successful raid on Tokyo and other cities by Amer. aircraft surprised the enemy, who took reprisals by executing sev. captured Amer. airmen. Early in May a concentration of transports and warships off Tulagi in the Solomons was a signal to attack. In the battle of the Coral Sea (4–8 May) an Amer. naval force under Adm. Fletcher defeated the enemy with severe loss. On 3 June a powerful Jap. fleet was sighted 700 m. W. of Midway Is., an Amer. outpost. Next

day began a battle, fought on the same lines as that of the Coral Sea, in which island-based bombers and carrier-borne aircraft attacked the Jap. ships, while Jap. machines attacked the is. and the Amer. carriers; no surface ships met in combat. These 2 'naval' victories marked the turn of the tide thus early in the Far E. war. (See NAVAL OPERATIONS IN SECOND WORLD WAR, *Naval Operations, July–December, 1942.*) But despite these defeats the Japanese still endeavoured to extend their Pacific conquests by, e.g., occupying the Aleutians (q.v.), and advancing against Port Moresby (July 1942), in New Guinea. But on 7 Aug., the Americans delivered a blow which began to reverse the whole progress of the Pacific war. This was the landing on Guadalcanal Is. in the Solomons of a strong force which captured an unfinished airfield of great importance and stormed and held the Jap. base. The Japanese made a series of intensive attempts to drive out the Americans and landed troops under cover of heavy air support. The Americans were equally pertinacious. After a series of very hard-fought actions off Cape Esperance (11–12 Oct.), off Santa Cruz Is. (16–26 Oct.), and off Guadalcanal itself on 12–15 Nov., where both sides employed battleships, the Americans were solidly estab. on Guadalcanal and on 9 Feb. 1943 organised Jap. resistance ended.

Japanese Held in New Guinea and in Burma: Aug. 1942–Mar. 1943. The Jap. attempt on Port Moresby failed owing to the defeat of a Jap. expeditionary force at Milne Bay (31 Aug. 1942) and the failure of the Jap. army in New Guinea to overcome the doughty Australians only 30 m. distant from Port Moresby. This rebuff and the recapture of the is. of Buna, Gona, and Sananda, whose garrisons were all completely eliminated, put the Japanese thenceforward on the defensive in New Guinea; and the destruction of a large Jap. convoy in the Bismarck Sea (2–4 Mar.), emphasised the Allied command of the sea.

Madagascar Occupied by the Allies—Salamaua and Lae Taken: Nov. 1942–Sept. 1943. The conquest of Vichy-controlled Madagascar, which concluded with the armistice of 5 Nov. 1942, removed the danger of a Jap. descent on this important is. and strengthened the Brit. position in the Indian Ocean. In 1943 the Americans destroyed the Japanese on Attu (11–30 May), and compelled them to evacuate Kiska in the Aleutians. In the S. fresh landings in the Solomons were followed by the conquest by Amer. and New Zealand troops of the is. of the New Georgia group in the Solomons (completed in Oct.). The landing of Australian forces in Huon Bay (5 Sept.) and a well-executed air-borne operation inland (5 Sept.) brought about the capture of Salamaua and Lae; and landings on Bougainville and New Britain further restricted enemy activities in this vast region.

Allies' 'Island-hopping' Campaign in the Pacific—Americans Take Saipan: Nov.

1942-June 1944. Up to Nov. the Allied command had advanced from one captured vantage point to another, a method characterised as 'island-hopping.' But the great increase of the Amer. Navy in ships and in carriers, the Allied superiority in the air, and improvements in the design of landing-craft, were all contributory factors which now enabled the High Command to concentrate on key points while by-passing less important positions which could be masked and put out of action by its spare strength in ships or aircraft. The struggle for the Gilbert Is., which ended on 20 Nov., showed that in many cases the Japanese were prepared literally to fight to the last man, and this they did at Makin and Tarawa (Nov. 1943). The next westward jump of the Americans was in late Jan., when they landed in the Marshall Is., taking the important airfield of Kwajalein—the first pre-1941 Jap. ter. taken in the war. It provided a base for bombing Truk, the greatest of Jap. Pacific bases. Resistance ended in the Marshall Is. by 4 Feb. Continuing a westward and northward course, the Americans reached the Marianas and in June captured the strong Jap. is. of Saipan, where for the first time they had won an air-base within long bombing range of the Jap. homeland and of the Philippines.

Burmese Campaign—British Army in the Chindwin Valley: Aug. 1943-Dec. 1944. Meanwhile a remarkable campaign was being fought in Burma. Help for China was the main preoccupation of the military discussions at the Quebec Conference, and in Aug. 1943 it was announced that it had been decided to form a separate SE. Asia Command for operations based on India and Ceylon against Japan. In Oct. Stilwell's mixed Amer. and Chinese forces marched into the most northerly part of Burma together with ancillary troops to construct a road and pipeline from Ledo to Yunnan. The progress made compelled the Japanese to attack the Brit. forces in Manipur State, on the Indo-Burmese border. This was a most critical move, for had it succeeded Stilwell's communications would have been cut. The Japanese also counter-attacked in Arakan. But in Mar. airborne troops under Wingate (who was accidentally killed on 24 Mar. 1944), came down behind the Japanese opposing Stilwell and wrought havoc with their communications for 3 months. The Jap. counter-attack in Arakan was defeated, and the Jap. Manipur offensive, after appearing to be menacing for some time, was brilliantly repulsed by the Fourteenth Army (q.v.) under Gen. Slim. In the N., Myitkina was entered on 19 May, while the Anglo-Chinese forces seized Mogaung (25 June). In the centre of the country the decision of Lord Mountbatten (q.v.) to fight through the monsoon period brought the Fourteenth Army by Dec. into the Chindwin Valley. The remarkable use of aircraft for the reinforcement and supply of the Allied troops was the outstanding characteristic of this brilliant campaign.

Americans Invade Leyte Island in the Philippines: June-Oct. 1944. The Jap. fleet tried vainly to relieve Saipan (19-20 June). The Americans, having captured the Marianas, were now bombing the Philippines. On 20 Oct. a large Amer. expeditionary force landed on Leyte Is. The Jap. fleet attacked in 3 widely separated but co-ordinated actions the Amer. Third and Seventh Fleets, but suffered heavy losses in ships and aircraft.

OPENING OF THE WESTERN FRONT, AND THE COLLAPSE OF GERMANY. Anglo-American Invasion of Normandy: June 1944. The landing in Normandy (see WESTERN FRONT IN SECOND WORLD WAR), was preceded by systematic bombing of Ger. industrial centres and air factories, even those sited far to the E., the destruction of communications with the coast, and of bridges, radar installations, airfields, and coastal defences. The Allies had devised landing craft which would put men and munitions directly on the beach, and they towed across the Channel the sections of a prefabricated 'Mulberry' port (see ARROMANCHES). They had no need, therefore, to storm a port, and landed between the riva. Orne and Vire on 6 June 1944. The method of attack took the Germans by surprise: they expected attack on a port. The British attracted strong resistance before Caen, thus helping the Americans to break into the Cotentin Peninsula and capture Cherbourg. Some weeks of obstinate positional fighting ended in a double Allied advance—by the Americans towards Le Mans and by the Canadians towards Falaise. When the Americans thrust northwards to Argentan their thrust suddenly assumed the aspect of a vast enveloping movement. The whole Ger. Army in Normandy, into which troops from the rest of France had been drawn during the preceding weeks, was enclosed in a narrow-mouthed pocket from which it could withdraw only under withering fire. Cherbourg fell on 26 June, but even after this loss the Ger. High Command continued to cherish the illusion that they could still hem the invaders within an area too small for manoeuvre. Hence they strengthened their field fortifications at Caen and St Lô, taking every possible advantage of the tangled difficult bocage country between those tns. The British encountered strong resistance before Caen, but captured most of the tn by 9 July; while the Americans took the important tn of St Lô on 18 July. The breakthrough began a week later, and soon Amer. columns of the Third Army under Patton (q.v.) were sweeping W. into Brittany and S. to the Loire. The Amer. forces now turned E. and captured Le Mans on 9 Aug.

German Débâcle at the Falaise Gap—Allies Enter Paris: Aug. 1944. The Americans then swung N. towards Argentan whilst the British and Canadians battled towards Falaise. In the Falaise 'pocket' so created, the Ger. Seventh and Fifth Panzer Armies were ruined, and the remnants (chiefly the Panzer divs.), fled headlong to the Seine. The pocket itself

was eliminated on 22 Aug. This disaster, combined with a Fr. national revolt and victorious advance of The Amer. Seventh Army under Patch (q.v.), which landed in the S. of France on the strip of coast between Nice and Marseilles, convinced the Germans at last that France could no longer be held. By 17 Aug. Amer. tanks had seized Chartres and Orleans and were rushing upon Versailles and Mantes. On 24 Aug. a Fr. armoured force under Leclerc, of Lake Chad fame, entered the cap. (see PARIS), and the Ger. commander surrendered on the 25th.

Gen. Alexander's Troops Enter Rome: Feb.-Aug. 1944. Before the great events of D-Day were actually in progress in Normandy, the last great Allied offensive had begun with Alexander's resumption of the offensive against Kesselring's positions between Rome and Naples. The former's armies, the Fifth and the Eighth, contained many different nationalities, and among the most daring were the Fr. Moroccans who captured Monte Majore and pierced the strong Gustav Line in Feb. 1944. This magnificent feat of arms compelled Kesselring gradually to abandon his whole position S. of Monte Cassino, and when Cassino (q.v.) itself was stormed a further advance linked up the troops with those on the Anzio-Nettuno beachhead. Rome (q.v.), which had not been seriously damaged by the Allied bombing of rail and marshalling yards, was entered by the victorious Allies on 4 June. The loss of Rome was due to Kesselring being completely outmanoeuvred in an outflanking drive from the Anzio beachhead and the Alban Hills, and in his retreat he lost many prisoners and much material. By late Aug. Alexander had hustled Kesselring back to the Gothic line, Florence (q.v.) being liberated, with, however, much damage, especially to its bridges.

Russians Resume Offensive—Conquest of White Russia—Capture of Bialystok. Brest-Litovsk, Vilna, Siauliai, and Kaunas: June to Aug. 1944. In the midst of their preoccupations on the W. and S., the Germans found that the Russians had resumed the offensive. The first great blow fell in White Russia around Vitebsk, which fell on 26 June, while the 6 Ger. divs. caught around the town were wiped out. In the ensuing month the Russians took Minsk, Vilna, Polotsk, Lvov, Bialystok, Brest-Litovsk, Przemysl, Stanislawow, and other strongholds. The Russians in the N., having seized Vilna on 13 July in their advance S. of the famous Pripiet marshes, and Grodno, Pinsk, and many other towns in the N., were now seriously threatening the Ger. armies in the Baltic States, with the result that the Germans began 'pulling out' to some extent; thus they abandoned Pskov (23 July) and Narva. But the most dramatic reversal of Ger. fortunes was in Poland, where many towns were captured by the Russians. Lublin, Siedlce, and Lvov fell, and the loss of the rail junction of Siauliai cut off the last escape route into Germany from the more northerly Baltic States, and this loss was followed by that of Mitau (31 July) and

Kaunas on 2 Aug. The Finnish puppet president resigned on 1 Aug., and the Germans then took the opportunity of withdrawing their troops sent to support him.

Attempted Assassination of Hitler. An unsuccessful attempt was made on 20 July to kill Hitler by means of a small bomb in his operations-room, and this affair led to a 'purge' of high-ranking Ger. officers actually, or believed to be, implicated in the plot, and thousands of others who might have led another rising. As the result of this plot Himmler (q.v.) was appointed chief of all security forces, and also to the command of all the Ger. Home Forces.

Rise of the French 'Maquis': Aug.-Sept. 1944. The Ger. difficulty was now to withdraw divs. from the country which the Americans and British, aided by the Fr. *Maquis* (F.F.I.), who rose everywhere, threatened to overrun. For some months the Allies could send troops only through the battered Cherbourg and the artificial harbour of Arromanches. This restriction gave the Germans an opportunity of reaching the W. Wall, but, W. of Paris, many were still resisting in the thickly wooded bends of the Lower Seine, while E. of the cap. they were fighting on a line along the Marne, though fully prepared to fall back on Metz, Nancy, Belfort, and Epinal.

Germans Driven out of France and Belgium—Allies Advance against the West Wall: Aug.-Sept. 1944. The Allies made their final assault on Germany in this order: Canadian First Army, Brit. Second Army, Amer. First Army, Amer. Third Army, Amer. Seventh Army, and Fr. Army. On 29 Aug. the First Army took Soissons and the Third Army took Verdun on 1 Sept., and St Mihiel, being in fact already nearly 130 m. beyond Paris, which itself had fallen on 25 Aug. Patton was soon at the outskirts of Nancy and on the banks of the Moselle, but, having outrun his supplies, had to wait and allow the Germans to fortify the riv. line, and it was here that some of the toughest fighting of the W. front took place. Montgomery's advance was equally spectacular. Having estab. a bridgehead over the Seine on 29 Aug., his armour drove northwards for 250 m., liberating in a few days Amiens, Arras, Lille, Brussels (3 Sept.), and Antwerp (4 Sept.), and establishing a line which isolated all the Ger. forces in NE. France, including Picardy and the Pas de Calais, and also Flanders. This was now a war of manoeuvre following many wearisome weeks of dour conflict in cramped beach and bocage country, and the Allies took full advantage of their great opportunity. The Americans took Namur, Liège, Ostend (both the latter on 8 Sept.), and 2 days later, having traversed Luxembourg, entered Germany and shelled Aachen. The Germans, having now been for the most part expelled from France, it now remained for the Allies to invade the line of the Rhine.

The Battle of Arnhem: Sept. 1944. Before this line of defence was consolidated the Allies made a bold attempt

to turn it and so shorten the war. This was the ill-fated Arnhem expedition, in which U.S. and Brit. airborne divs., and a Polish parachute brigade, were dropped in the hope of seizing the bridges over the Maas, Waal, and Lower Rhine. Ground forces successfully linked up with the 2 westerly airborne divs. but they were delayed at Nijmegen and arrived too late at the Lower Rhine. On 25-26 Sept. those troops of the Airborne Div. who could be withdrawn were brought back across the Lower Rhine. Just over 2000 were saved, but casualties numbered 7000. Fine weather was essential to employment of the low-flying Tactical Air Force, and very soon the heavy mists combined with the well-organised defence in depth compelled the Allies to face some months of methodical siege warfare against the chief Ger. positions. By Dec., Metz, Strasburg, Aachen, and most of the Channel Ports had been taken, but these latter were too small to be of much use to the Allies, and every effort had therefore to be made to make Antwerp available for use.

Von Rundstedt's Counter-attack in the Ardennes, Dec. 1944-Jan. 1945. On 16 Dec. von Rundstedt launched a desperate but well-conceived Ardennes offensive, taking full advantage of the foggy, snowy weather. For a fortnight the Germans made good progress in the direction of Liège, but extensive counter-measures were swiftly put into effect. The Germans drove a wedge 45 m. deep, but the shoulders were held at Monschau, and, with great gallantry, at Bastogne. Fortunately for the Allies the weather cleared, and from 22 Dec. the superior Allied air strength was thrown in with great effect. The tide of battle was now soon reversed, and by the end of Jan. the Allied line was reformed. Their offensive had been delayed for at least 6 weeks, but Ger. losses were heavy, and the failure of their attack meant that the final issue could now hardly be in doubt.

Capitulation of Rumania—Premature Polish Rising in Warsaw: June-Aug. 1944. The Russian summer offensive, as shown above, lasted from June to Aug. While success had favoured the Russians on every front, the resistance in the Baltic States, E. Prussia, and Poland was much stiffer and more effective than on the rest of the fronts. The Russians occupied all the chief Rumanian towns between 21 and 31 Aug., and during that period Rumania capitulated to the Allies and accepted German peace terms. In this way the Germans lost the irreplaceable Rumanian oil-supply and the best of their satellite Armies, while the gate was now open to the Russians to exploit the Balkans generally, and indeed a few days later Bulgaria declared war on Germany. Between Aug. and the end of 1944 the Russians continued to make most progress from the Balkan end of their front. Meanwhile, when Russian tanks and motorised infantry appeared 10 m. E. of Warsaw, the Polish 'Home Army' under Gen. Bor interpreted this as a signal for insurrection, and the order to start it

was given on 1 Aug. But the Russian advance stopped, and the Polish insurgents were left to face the Germans alone, with most tragic consequences.

Athens Liberated—Civil War in Greece: Oct. 1944-Feb. 1945. In the autumn Ger. units began to filter back from Yugoslavia and Greece, attacked everywhere by insurgents, who were emboldened by the rumour of the oncoming Russian avalanche. Athens was liberated by the British on 14 Oct., Belgrade by Tito and the Russians on 20 Oct. Following liberation, the Gk Left partisans, E.L.A.S., or National Popular Liberation Army, E.A.M., or National Liberation Front, and other bodies fomented a civil war, which was stopped for a time only by the energetic military and diplomatic intervention of Britain, Churchill himself visiting the country. While, however, the Germans were driven out of the Balkans and gradually from Yugoslavia too, the great Russian offensive in the S. had developed into the invasion of Hungary, where the siege of Budapest began in Dec. Hitler now began to reinforce his S. front with armour, which was badly needed elsewhere, for he must save Budapest and the approaches to Vienna at all costs. The Ger. counter-attacks were so effective that the Russians could not conquer Budapest until 13 Feb. 1945.

Germans Launch Flying Bombs and Rockets on England—Effective British War-time Devices. At the beginning of 1945 public opinion in the Allied countries was exercised over the fact that the Germans seemed to have neutralised their defeats in the W. and E. fronts so far, at least, as to be able to reorganise their defences and launch counter-attacks. The Germans started to launch flying bombs (q.v.) on England from Fr. sites in June 1944. Following the capture of the launching sites in the Pas de Calais, the danger from flying bombs (V1) was lessened, although they continued to fall in Belgium (chiefly at Antwerp) until Mar. 1945. But the rockets (V2) could not be warded off.

Brit. ingenuity overcame many difficulties: installations known as 'Pluto' (see PIPELINE), conveyed oil to the W. Armies through pipes laid under the sea. By the help of radar (q.v.), the bombers could hit targets which they could not see, and by the help of 'Fido,' a Brit. device for dispersing fog, they could take off and land in most kinds of weather. The opening of the Scheldt after the capture of Walcheren in Nov. 1944 made the great port of Antwerp available for handling supplies.

Russian Armies Invade the Polish Plains, E. Prussia, and Austria: Jan.-Feb. 1945. With the turn of the year, the Russians swept along a massive front to the plains of Poland, Prussia, and Austria. From the Baltic to Budapest their armies, which had already liberated Warsaw, Radom, Lodz, and Cracow, were tearing great gaps in the Ger. E. front in a grand final offensive on 3 main fronts: in the N. under Rokossovsky, in the centre under Zhukov, and in the S. under Konev; and,

soon afterwards, Rokossovsky's right flank turned to co-operate with Cherniakov's forces from the E. in a combined assault on E. Prussia. The Ger. defeat was complete, and in Jan. the Russians captured Tilsit, Insterburg, Allenstein, and Tannenberg; on the 25th they took Gleiwitz in Upper Silesia and shortly afterwards crossed into Pomerania and Brandenburg. Breslau was encircled and besieged in Feb. Poznan fell on 23 Feb. after a month's siege, and Torun had already fallen. It was evident to the Germans that they could not hope to defend both the area of Berlin and that of the Upper Silesian coalfield. Hence they must organise a strong line along the Oder through Stettin and Frankfurt.

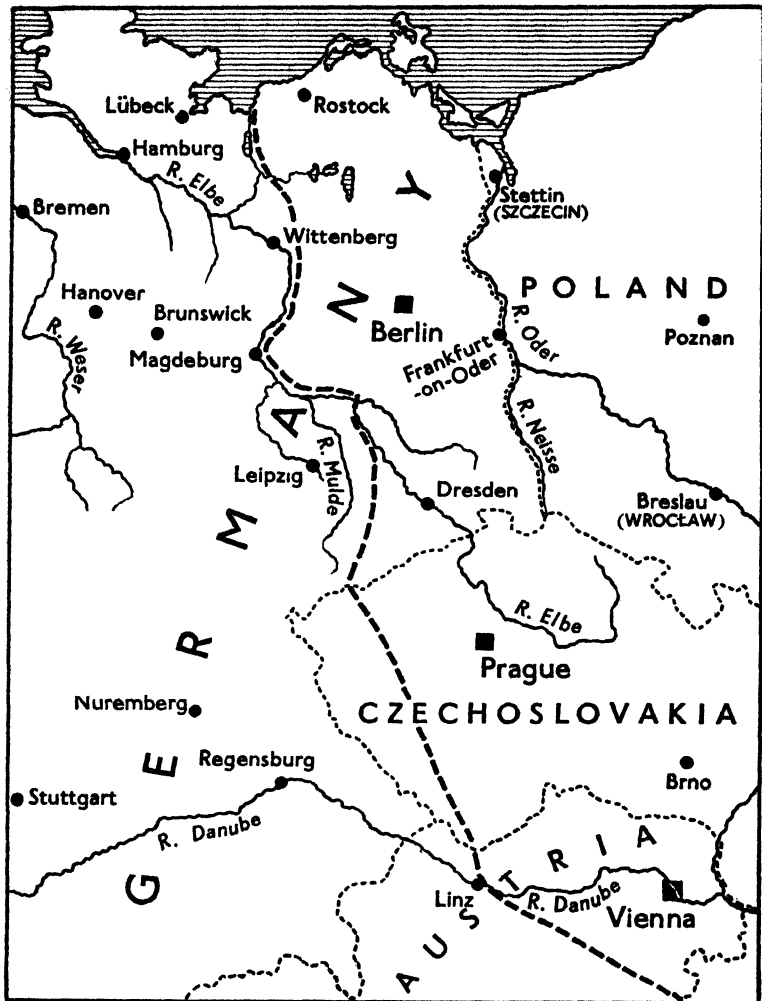
Yalta Conference: Feb. 1945. From 5 to 12 Feb. Churchill, Roosevelt, and Stalin, met at Yalta to consider Russo-Polish relations and the allocation of administrative zones in Germany among the major Allies after the War. The conference also considered strategy.

Allies' Final Western Front Offensive—Cologne Taken—Germans Trapped in the Saar Basin—Montgomery Crosses the Rhine—Americans Encircle the Ruhr—Canadians Liberate Holland—Bremen Captured: Feb.—April 1945. Stubborn fighting over the Dutch waterways and for the great Roer dams occupied the early weeks of 1945. Then on 22 Feb. a heavy bombing attack made on over 30 of Germany's chief rail depots heralded the opening of the W. Allies final offensive with 6 armies (1 Canadian, 1 Brit., 3 Amer., and 1 Fr.). The Roer was forced and its chief strongholds, Jülich and Düren, were captured on 24 and 25 Feb. The Allied armies in the N. closed on the Rhine crossings at Xanten, Weesel, and Rheinberg, and on 7 Mar. captured Cologne. On the same day Amer. troops crossed the Rhine at Remagen (the one bridge which the Germans had not succeeded in destroying), and the Germans W. of the Rhine found themselves trapped by a link-up of the forces of Hodges' and Patton's armies. The attacks of the Canadian, Scottish, and other Brit. troops, and of the Amer. Ninth Army led to a general retreat on the N. sections of the Ruhr front. In a rapid advance Patton's army crossed the Moselle behind Coblenz, and, sweeping up the Rhine through Ludwigshafen, trapped between his and Patch's army nearly the whole of the Ger. armies in the Saar Basin and Palatinate. This freed the path for the invasion of Central and S. Germany, and the situation was very rapidly exploited by the 2 Amer. gens., whose victorious armies carried all before them. Mainz fell on 20 Mar., and Frankfurt on 26 Mar. On 23 and 24 Mar. Montgomery made a double Rhine crossing with the Second Brit. and Ninth Amer. Armies. Other crossings farther S. resulted in the Ger. abandonment of a 200-m. stretch of the Rhine. The Amer. Ninth Army advanced, by-passing the Ruhr, and with Hodges' Army encircled the whole of that industrial area, trapping 21 divs. and taking 325,000 prisoners. The eventual capture of the Ruhr area proved far

less difficult than was expected. The Brit. Second Army advanced through Osnabrück, with Bremen as its objective, while the Canadians were employed in the liberation of Holland. When the W. Allies reached the Elbe they were ordered to halt, evidently in order not to encroach on a sphere already earmarked for the Russians. When the Allied thrust through Central Germany ceased, Amer. troops were practically on the Czech border. Leipzig and Dresden were all but surrounded, and the Elbe had been crossed S. of Magdeburg. Hanover, Brunswick, Essen, Halle, Weimar, and Stuttgart had already fallen to the Americans. Bremen fell to the British on 26 April. When temporarily halted on the Oder line the Russians pressed forward on their right flank and, on their extreme left, through Hungary. In the N. they took Königsberg on 9 April. On 13 April they captured Vienna. Meanwhile the other Russian armies crossed the Oder and Neisse and the siege of Berlin had begun. Amer. and Russian troops met on the Elbe on 25 April.

Fall of Berlin—Germany's Unconditional Surrender: April—May 1945. The final scenes were swiftly enacted. The Nazi leaders decided to make the final stand in the built-up area of Berlin, but it is probable that the Germans did not hope to do more than hold out for sufficiently long to induce the Allies to grant more favourable terms than those of unconditional surrender or, still more probably, they hoped to divide the W. Allies and Russia. At all events, in the last week of April Himmler (it was assumed that Hitler had perished in the ruins of his Chancellery) offered Germany's surrender to the W. Powers only; but the reply was that the Allies stood together. In Italy Bologna was taken on 21 April; Genoa was reached on 27 April, and Milan on the 29th. It. partisans had previously estab. control in most of N. Italy. On the 28th Mussolini was captured by partisans when trying to escape into Switzerland and executed on the 29th. On 1 May the Hamburg radio announced Hitler's death and Adm. Dönitz (q.v.) proclaimed himself his successor as Führer. On 2 May Berlin surrendered to the Russians. On the next day Hamburg fell to the British. On 5 May the Ger. Nineteenth Army in the S., and on the 6th Army Group G, surrendered. On 5 May all Ger. forces in NW. Germany, Holland, and Denmark, surrendered to F.-M. Montgomery. On 7 May, the final capitulation took place at Rheims, effective from midnight of 8-9 May. Formal ratification took place in Berlin on the night of 9 May. With victory in sight, Roosevelt died on 12 April.

THE DEFEAT OF JAPAN: Americans Land in Luzon: Dec. 1944—Feb. 1945. The sole success for Jap. arms in 1944 was in China, where, having at length captured Changsha and cleared the Chinese-held sections of the Peking-Hankow railway, they took the offensive in S. China, and seized the airfields from which the Fourteenth (previously Tenth) Amer. Air



THE LINE OF CONTACT BETWEEN THE WESTERN AND SOVIET ARMIES IN APRIL 1945 IS SHOWN BY THE THICK BROKEN LINE

Force had been raiding as far N. as Manchuria. They then made an ambitious attempt to reach the Burma Road (q.v.), which was about to be reopened, but were repulsed in Dec. by Chinese troops under the Amer. gen. Wedemeyer. Before the end of the year Leyte was practically conquered. Already Super-Fortresses were attacking Japan from Saipan Is., and Amer. progress in the

Philippines indicated that such attacks would increase in vol. whatever might be met in China, whether through Jap. military success or Chinese civil conflict. On 9 Jan. 1945 MacArthur's forces landed in Luzon. Manila was occupied on 4 Feb. Bataan and Corregidor were cleared by the third week of Feb. The invasion of Luzon was accompanied and followed by heavy air attacks on Jap. bases and

airfields in Indo-China and Formosa, which destroyed much of their air power and still further reduced their depleted shipping.

Fall of Mandalay and Rangoon, Mar.-May 1945. In Burma the outlook was equally bleak for the Japanese. The Fourteenth Army (q.v.) now closed on Mandalay, while the 15th Indian Corps seized Akyab and drove the Japanese from Arakan. Mandalay fell on 20 Mar. after a well-executed operation had cut the Jap. S. communications at Melktila. In Mar. and April the rest of the enemy's army in Central Burma was destroyed or driven, mainly, into the Shan Hills, and on 2 May Rangoon was entered and the remnants of the Jap. army, isolated and faced with intermittent Burmese as well as Brit. attacks, had no hope.

Okinawa Conquered—Atomic Bomb Dropped on Japan—Japan's Unconditional Surrender: Feb.-Aug. 1945. The Jap. counsel of despair was to resist desperately in the belief that the losses they might inflict would induce the Allies not to insist on unconditional surrender, and certainly those they inflicted, through 'suicide planes' carrying loads of explosives and through ground defence, were heavy. The garrison of Iwojima resisted to the last, from 19 Feb. to 20 Mar. The reduction of Okinawa, defended to the death by 100,000 men, cost the Americans, whose Pacific Fleet had been reinforced by Adm. Rawlings's Brit. squadron, 40,000 casualties. Again, in Borneo, where Australian and Dutch forces landed at Tarakan (1 May), in Sarawak (19 June), and Balikpapan (1 July), the Jap. garrisons, cut off from any hope of succour, resisted desperately, as also they did in New Guinea and Bougainville. But defeat became more certain. City after city in the industrial regions of the Jap. homeland was bombed in attacks which almost rivalled in intensity those against Germany. On 6 Aug. the first atomic bomb exploded over Hiroshima (q.v.), destroying 4 sq. m. of the city. On 8 Aug. Russia declared war on Japan, and next day the Red Army invaded Manchuria. On 9 Aug. a second atomic bomb laid Nagasaki (q.v.) in ruins. This proved enough, yet it is to be remembered that Japan was already on the verge of defeat: that day the Jap. Gov. accepted the Allied terms, provided these did not prejudice the prerogatives of the Emperor, a proviso which did not in the interpretation make the surrender other than unconditional. The official surrender in S.E. Asia took place on 12 Sept. at Singapore.

CONCLUSIONS. The Ideals of the United Nations—Churchill's Strategy. If Roosevelt was the inspired interpreter of the ideals of the U.N. (q.v.) in this war of conflicting ideologies, in which W. civilisation was itself at stake, it fell to Winston Churchill to play the chief rôle of determining the grand strategy of the alliance. His was the imaginative vision that insisted, even when England lay isolated before the imminent threat of invasion, upon preparing a design of

war that would offer full scope for the existing unity of the Commonwealth and for the larger unity of world powers of which he foresaw it must become the nucleus before victory was won. A strategy concentrated upon the safety of the Brit. Is. would have lost the war. But it needed great courage to act upon that opinion when action meant diverting to the Middle E. the only armoured formation available



THE SURRENDER IN SOUTH-EAST ASIA

Admiral Mountbatten, Supreme Commander, South-East Asia, announcing the signing of the Japanese surrender to the representatives of the fighting services of the Allies and the people of Singapore, 12 Sept. 1945.

to meet the expected descent upon the Channel coasts. 'With a deep knowledge of military hist., Churchill committed his country to the pursuit of its traditional strategy, to maintain the Empire's lines of communications round the globe, to contain the enemy within the ring of sea-power, and to challenge him on land at the extreme limits of his dominion until his strength should begin to exhaust itself. Thus would time be won to mobilise the reserves of the Imperial commonwealth and to range in the line for the decisive stroke, the forces of all other nations that would rally to the standard of liberty.' (*The Times*, 8 May 1945.)

It may be freely acknowledged that there was a time when, had the Germans' mastery of the art of war matched the immense superiority of their material power, no human valour or effort could

have defeated them. But in the Second, as in the First, World War Germany failed to achieve an early victory, and the passage of time found her unable to equal the growing strength of the U.S.A., the Brit. Commonwealth, and Russia, even though the first two were burdened by the fight against Japan. The outstanding feature of the Second World War was its totality: the belligerents' resources were developed to the utmost degree, the idea of 'rules of war' was abandoned, and the distinction between civilian and soldier became irrelevant in the face of air-power.

The Second World War marked the emergence of the U.S.A. and Soviet Russia as the major world powers, and within a few years of its conclusion the world was to be divided into 2 blocs based on these 2 powers, each with their deeply conflicting ideologies, with a third, less powerful 'neutralist' bloc, consisting of the newly independent Asian countries. The war left Germany shattered and physically divided; while France and Britain emerged from the struggle considerably weakened. It is ironical that while the Ger. invasion of Poland actually occasioned the outbreak of fighting, Poland emerged from the War within the Soviet sphere of influence and soon became, in theory as well as in fact, a Communist state. For results of the war see *FURTHER EUROPE, History*. See also the articles on persons and places named.

For operations in detail see AFRICA, NORTH, SECOND WORLD WAR CAMPAIGNS IN; BURMA, SECOND WORLD WAR, CAMPAIGNS IN; CRETE, THE BATTLE OF (1941); EASTERN FRONT or RUSSO-GERMAN CAMPAIGN, IN SECOND WORLD WAR; GREECE, SECOND WORLD WAR, CAMPAIGNS IN (1941); ITALIAN FRONT, SECOND WORLD WAR, CAMPAIGNS ON; ITALIAN EAST AFRICA, SECOND WORLD WAR CAMPAIGN IN (1941); MALAYA, BRITISH, JAPANESE INVASION OF (1941-2); NORWAY AND DENMARK, GERMAN INVASION OF (1940); NAVAL OPERATIONS IN SECOND WORLD WAR; PACIFIC CAMPAIGNS ON FAR EASTERN FRONT, IN SECOND WORLD WAR; WESTERN FRONT IN SECOND WORLD WAR. See also AERIAL WARFARE; AIR RAIDS; ANTIAIRCRAFT DEFENCE; 'ARK ROYAL'; BERLIN, PACT OF (1940); 'BISMARCK', THE; BRITAIN, BATTLE OF; CASSINO, BATTLE OF; CASUALTIES; COMBINED OPERATIONS COMMAND; DIEPPE RAID; EIGHTH ARMY; FLANDERS, BATTLE OF (1940); FORTIFICATION, *Field Fortifications and Tactics in the Second World War*; FOURTEENTH ARMY; HOME GUARD; LONG RANGE DESERT GROUP; MATAPAN, BATTLE OF CAPE; 'MEIN KAMPF'; PEARL HARBOR; POPOSKI'S PRIVATE ARMY; SAN FRANCISCO CONFERENCE; SANGRO; SECRET WEAPON; SPECIAL AIR SERVICE; STRATEGY AND TACTICS.

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Worm Grass, see PINK-ROOT.

Worms, Ger. city in the Land of Rhine-land-Palatinate (q.v.), on the Rhine (q.v.), 25 m. S. by E. of Mainz. It is one of the oldest cities of Germany and its Roman name was Borbetomagus. It was important in the time of Arminius (q.v.) and was fortified by Drusus (q.v.) in 14 bc. In the 5th cent. it was a cap. of the Burgundii (q.v.). It early became a bishopric, and it was made a free city of the Empire in the 11th cent. More than 100 Imperial Diets met in the city: at the Diet of 1122 the investiture (q.v.) question was settled between the Emperor, Henry V and Pope Calixtus II (qq.v.); at the Diet of 1521 Luther appeared before the Emperor Charles V (qq.v.). There was severe damage during the Second World War. The impressive Romanesque cathedral dates from the 11th cent., and there is a 13th-cent. synagogue. Monuments in the city include one to Luther and one commemorating the Nibelungen legend (see NIBELUNGENLIED). W. has manufs. of machinery and textiles, and is the centre of an important wine-producing dist.: the well-known *Liebfraumilch* takes its name from that of a 14th-15th-cent. church in the city. Pop. 60,000.

Worms, see ANTHELMINTICS; PARASITES; EARTHWORMS.

Wormwood (*Artemisia absinthium*), tall perennial plant (family Compositae) with silky stems and leaves and numerous small yellow flower heads. It is one of the chief ingredients from which absinthe is derived, and is used as a tonic.

Wormwood Scrubs, dist. of W. London in the bor. of Hammersmith, lying N. of Shepherd's Bush. It gives its name to a recreation ground and to a large prison.

Worsborough, urb. dist. and industrial and agric. tn of the W. Riding of Yorks, England, 3 m. S. of Barnsley. It is a colliery centre. Pop. 14,250.

Worsley, urb. dist. of Lancs, England, 6 m. from Manchester, and incorporating the tn of Little Hulton, with extensive coal mines. The dist. has cotton factories and engineering works. Here was begun the Bridgewater Canal in 1759. Pop. of dist. 28,880.

Worsted, see WOOL.

Wörth, see WÖRTH.

Worthing, vil. and par. of Sussex, England, 8 m. NNW. of Haywards Heath. There is an 11th-cent. church, largely Saxon, with what are probably the first examples of the true arch known in England. To the S. is W. Forest; W. was formerly a centre of the Weald iron industry. Pop. 5000.

Wörther, Lake, see KLAGENFURT.

Worthing, municipal bor. and seaside resort on the Eng. Channel, Sussex, England, 10½ m. from Brighton and 60 m. from London. There is a fine marine parade and numerous parks and public gardens with tennis courts, putting greens, and bowling greens, a pier, 3 golf courses, and good bathing and boating facilities. At Broadwater, within the bor., is the church of St Mary, a fine example of mingled Saxon and Norman ornamental architecture. The new tn hall dates from 1932. Flowers and fruit are grown. One member is returned to Parliament. Pop. 70,000.

Wortley, rural dist. of Yorks (W. Riding), England, lying between Sheffield to the S. and Barnsley to the N.E., comprising the pars. of Bradfield, Ecclesfield (q.v.), Tankersley (q.v.), and W. Constitute in 1894; it covers an area of 43,697 ac. and includes 17 vils. Pop. (rural dist.) 45,240.

Wotan, Wuotan, see ODIN.

Wotton, Sir Henry (1568-1639), diplomat and poet, b. near Maidstone. Educ. at Winchester and Queen's College, Oxford, he was secretary to the Earl of Essex during Elizabeth's reign, and under James I was for 20 years in the diplomatic service. W. was the originator of the epigram, 'an ambassador is an honest man sent to lie abroad for the good of his country.' In 1624 he was made provost of Eton. Izaak Walton's life of Wotton was prefixed to the *Reliquiae Wottonianae* (1651). See also life by L. P. Smith, 1907.

Wounds, rupture of the soft structures of the body. They are usually classified as incised, punctured, contused, and lacerated. An incised W. is a clean cut, such as is made by a knife. The blood-

vessels being cut clean, they bleed more freely than other kinds. The opening tends to gape on account of the retraction of the superficial structures. When the edges of such a W. are kept closed together healing generally proceeds by 'first intention', that is, the 2 surfaces soon become united by a film of lymph, which develops into connective tissue. Punctured W.s are those produced by the thrust of a pointed instrument. They are dangerous according to their depth; a deep-seated organ may be injured or the instrument may have carried in septic germs. There is frequently little bleeding apparent, though there may be dangerous internal haemorrhage. Contused W.s are caused by blunt instruments, or by falls. There is usually very little bleeding, though the parts may be extensively bruised. Owing to the injury to the small blood-vessels, healing may be protracted. Lacerated W.s are produced by injuries from machinery, the teeth and claws of animals, etc. They are dangerous when extensive, as there is considerable danger of infection by germs. Healing is usually by 'second intention'; a film of lymph forms over the W. and granulations form. A scar ultimately takes the place of the destroyed skin. If tissue has been much destroyed, extensive sloughing may take place. In treating W.s, it is necessary first to arrest the bleeding and then close the W. Where there is danger of septic infection, however, the W. should be cleaned and dressed with antiseptics. Penicillin and sulphonamides, both local and systemic, are now much used in the treatment of infected W.s. Skin grafts are employed for closure. In war-time especially prophylaxis against tetanus (q.v.) is important; tetanus antitoxin is also available.

Wouverman, or **Wouwerman**, Philips (1619-68), Dutch painter, b. Haarlem. He studied under his father, Paul Wouverman, and under Jan Wynants. His landscapes, hunting scenes, and horses are now appreciated for their meticulous finish, composition, and colour. His brothers, Jan (1623-82) and Peter (1629-66) worked on similar subjects.

Wouw, Anton van (1862-1945), S. African sculptor, b. Drie Burgen, Holland, and studied at the Rotterdam Academy. He went to the Transvaal in 1890, and struggled for a living until he suddenly won a commission for the President Kruger statue in 1899. The work was interrupted by the S. African War and the monument erected only in 1925. Meanwhile van W. had become S. Africa's most outstanding sculptor in the naturalist tradition, and produced fine studies in bronze, principally of the Bantu people.

Wrangel, Carl Gustav (1613-76), Swedish soldier, b. Skokloster, Uppsala. He became a maj.-gen. of infantry at the age of 24, and distinguished himself at the battles of Wolfenbützel (1641) and Leipzig (1642). He commanded the Swedish fleet against the Danes in 1644-5 and in 1646 succeeded Forstenson as commander-in-chief of the Swedish Army in Germany, playing a prominent part in the

later stages of the Thirty Years' War. He subsequently became a member of the Council of Regency, but failed as an administrator.

Wrangel, Peter Nikolaievitch (1878-1928), Russian soldier, b. St Petersburg. He served through the Russo-Jap. War and the First World War, mainly with the Cossacks. After the war he joined Kaledin (q.v.). Kaledin committed suicide in 1918, and W. joined Denikin's army. Denikin (q.v.), however, was defeated by the Bolsheviks in 1920, and he resigned, leaving W. in sole command of his disorganised army. Supported by the French, W. continued successfully to withstand the Bolsheviks until after they ended the war with Poland. W. was then compelled to evacuate his forces from the Crimea. He went to Belgium, where he lived in exile. See memoirs, 1929.

Wrangel Island, see OSTROV VRANGEL'YA.

Wrangler, term applied in the univ. of Cambridge, England, to those who have attained first-class honours in Part II of the mathematical tripos, i.e. the final examination for honours in pure and applied mathematics. The one who took the first place in Class I was, until 1912, called *Senior Wrangler*. Those in the second class are designated *Senior Optimes*, and those in the third *Junior Optimes*. The term is derived from an obsolete meaning of the verb, *wrangle*, meaning to give a public disputation.

Wrasse, a spiny-finned fish of the family Labridae. The general form of the body is like that of the perch (q.v.), but the back is straighter. There is a single long dorsal, and the ventrals are under the pectorals. Coloration is generally very brilliant. The flesh is of little food value. W. frequent rocky shores and coral reefs, usually in small shoals, and often concealed in seaweed. Also known as rock fish.

Wrath, Cape, most westerly point on the N. coast of Scotland, in the co. of Sutherland. It is one of a series of wild cliffs formed of gneiss, and is 300 ft high.

Wray, John, see RAY, or WRAY, JOHN.

Wrecks. The law on W. is contained in the Merchant Shipping Act (q.v.) so far as territorial waters are concerned. In earlier times flotsam, floating wreck; jetsam, property thrown overboard to avoid wreck; ligam, property sunk and marked with buoys for purposes of recovery; and derelict, or totally abandoned property, were distinguished from wreckage cast on the shore, and were claimed by the Admiralty on behalf of the crown. These are all now included in the one general term. Local receivers are appointed by the ministry of transport, which has taken over the powers of the board of trade (which dept. had itself taken over those of the admiralty), and the business of the receiver to take charge of any wreckage found or brought in (except in the case of that brought from extra-territorial waters by a foreign ship). It is the duty of all persons finding wreckage to notify the receiver, who must proceed to the place and take complete charge, not merely of property but of all means of

recovery, and of the work of persons near by, vehicles, means of approach, and so on, as also of public order, he also must notify the nearest customs-house, and, if the value is over £20, Lloyd's. The practical work is, in fact, done by customs personnel though the controlling authority is the ministry of transport. The duties of the receiver, if he is absent, devolve, first, on the chief customs officer; then on the chief officer of the coastguard, inland revenue officer, sheriff, justice of the peace, or officer of the navy or army on full pay. The wreckage, being received, is finally sold, unless claimed within a year by the owner, the proceeds being paid over to the crown or other person having the right, after the salvage (q.v.) claims and expenses have been deducted. These also must be paid before recovery by the owner, if his claim has been established. The authority of the ministry of transport is required for the sale of W. exceeding £5 in value. In any case, duty is also levied on goods so recovered as if they had been imported in the ordinary way. The receiver's duties also extend to cases of ships in distress and any services rendered; he, or a wreck commissioner appointed by the lord chancellor, holds a court of inquiry.

When W. occur in navigable waterways or harbours, the authorities responsible for the safety of such places have power to remove them, and claim expenses from the owners or underwriters if they have entered into possession. The statutory power given to harbour or conservancy authorities to remove or destroy any vessel sunk, stranded, or abandoned in any harbour or tidal water under their control and to sell the wreckage so as to reimburse themselves for the expense does not extend to Her Majesty's vessels (*Christie v. Trinity House*, 1919). The term wreck applies only to tidal waters and to vessels and their contents; in the U.S.A. it applies also to inland lakes and the large rivers. In proportion as ships have become larger and have discarded sails, the number of W. has largely diminished; storm warnings have contributed to the safety of vessels. On the other hand, the value of W. is generally larger and salvage may be very remunerative. The law relating to W. and salvage and to the duty of rendering assistance to vessels applies to aircraft on or over the sea or tidal waters in the same way as it applies to vessels, and, for this purpose, the law includes the Merchant Shipping Acts and other Acts covering the same subjects. In the past forty years, so far as Brit. W. are concerned, there were most losses of life at sea in the years 1912 and 1914: in 1912 a total of 2335, including 673 of the crew and 825 passengers on the *Titanic* (q.v.); and in 1914 a total of 1778, including 171 of the crew and 840 passengers on the *Empress of Ireland*. In 1928 the total was under 300; and in 1929 131 lives were lost. From 1932 to 1945, 952 vessels were lost and 1193 lives, the highest losses being 142 vessels in 1935 and 215 lives in 1936. From 1946 to 1956 some 300 vessels were lost and over 2100 lives,

the highest losses being 36 vessels and 291 lives in 1948. (Losses by hostile action in the two world wars are not included.)

See Board of Trade, *Instructions as to Wreck and Salvage*, for salvage operations. See also SALVAGE.

Wrekin, The isolated volcanic hill (1335 ft.) rising from the N. Shropshire plain, 2½ m. SW. of Wellington. It is composed of pre-Cambrian rocks, and has an earthwork and a beacon on the summit.

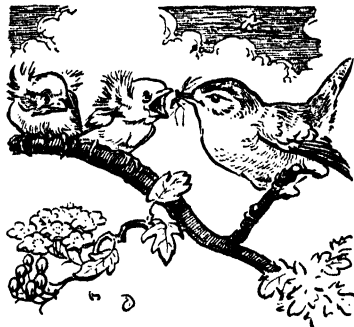
Wren, Sir Christopher, M.P., F.R.S. (1632-1723), architect and scientist; b. E. Knoyle, Wilt, son of a clergyman; had a brilliant career at Oxford as a scientist and mathematician; became a prof. of astronomy 1657; and did not turn to architecture until c. 1662, when he designed the chapel of Pembroke College, Cambridge; followed by the Sheldonian Theatre, Oxford, 1664-9. His rebuilding of St Paul's Cathedral lasted from 1675 to 1710. He also rebuilt 52 of the City churches destroyed in the Fire of London in 1666. He prepared a remarkable plan for rebuilding the City, immediately after the Fire, but it was not carried out. In 1669 he became Surveyor-General of the King's Works, and in that capacity built, rebuilt, extended, or altered sev. royal palaces, including Hampton Court, Kensington, St James's, Westminster, Whitehall, and Winchester; and also Windsor Castle, Chelsea Hospital, and part of Greenwich Hospital. Among his numerous other buildings may be mentioned Emmanuel College Chapel and Trinity College Library at Cambridge; 'Tom Tower,' and extensions to Queen's College and Trinity College at Oxford; the Royal Observatory, Greenwich; Winslow Hall, Buckinghamshire; Marlborough House; the churches of St Clement Danes and St James, Piccadilly, in W. London; sundry work in the Middle Temple, London; additions to Christ's Hospital, London; the Honeywood Library, Lincoln. He seems also to have furnished designs for Wm and Mary College at Williamsburg, Virginia, U.S.A.

The following buildings are also attributed to him: The Monument, London; Abingdon Tn Hall; 'Upper School' at Eton College; 'School' at Winchester College; Wolvesey Palace, Winchester; the College of Matrons, Salisbury; Bromley College and Morden College, Kent.

He restored Westminster Abbey and reported on the restoration of Salisbury and Chichester cathedrals. At the bicentenary of his death (1923), the 'Wren Society,' founded in his honour, began the pub. of 20 large vols. recording his architectural work. His life was written by his son under the title *Parentalia*, 1750. The most recent of many biographies are by G. Webb, 1937; R. Dutton, 1951; M. S. Briggs, 1953; J. Summerson, 1953; V. Fürst, 1956; E. F. Sekler, 1956.

Wren, a small passerine bird of the family Troglodytidae. *Troglodytes troglodytes* is the common bird ranging throughout Europe, N. Africa, and Asia. It is about 4 in. long and has short, rounded wings, and usually carries its tail over the back. Its plumage is rich reddish brown

it builds a large domed nest, and additional nests are often built close at hand. Its song is remarkably loud. It feeds almost entirely on insects. The gold crested W. (*Regulus cristatus*) belongs to the family Regulidae.



WRENS

Wrench, Sir John Evelyn (1882-), journalist, b. Brookesborough, co. Fermanagh. Educ. at Eton, he became a journalist under Lord Northcliffe in 1904. Later he devoted himself to Brit. Empire propaganda work. He founded the Overseas League in 1910 and the English-Speaking Union in 1918. He was knighted in 1923.

Wrestling has been practised by almost every nation and in every period since the days of anct Greece. In Homer's *Iliad* (xxiii. 700 ff.) there is an excellent technical description of an early contest. The Gk wrestling contest was divided into 2 parts: (1) the struggle to throw the opponent; and (2) the struggle on the ground, though on some occasions the simple throw decided the contest. At first the wrestlers wore a girdle, but in later times they wrestled naked. The body was previously rubbed with oil (strictly forbidden in modern W.) to make the muscles supple and to check perspiration, and was then sprinkled with sand to allow of a firm grip being taken. The loser had to be thrown 3 times before he was vanquished. Rom. W. was an imitation of the later form of the Gk sport. Neither must be confused with the modern Graeco-Rom. style, almost identical with Catch as Catch Can (Catch-Can) or Free style, the most popular modern style, except that no hold below the hips is permitted and the legs may not be used for either offence or defence. Throughout the Middle Ages W. (Catch as Catch Can style) was a favourite sport in England, mainly among the common people, though some kings were accomplished wrestlers. The Londoners were particularly distinguished for their skill, though the Cornish and Breton wrestlers were acknowledged as the best in Europe. Various styles were used. Those which have survived until

the present day, little altered in detail, are the Cornwall and Devon and the Cumberland and Westmorland styles. In the former the contestants wear a short, loose, strong jacket by which all holds are taken. The heavy shoes, for kicking purposes, vanished more than a cent. ago. Falls are heavy; a throw is a 'fair back,' i.e. both shoulders and a hip (or 2 hips and a shoulder) on the ground at the same moment. There is no ground W., which is a characteristic of both the Catch as Catch Can and Graeco-Rom. styles. In the Cumberland and Westmorland style the struggle begins when each wrestler has taken the statutory hold and joined hands. For this the left arm of each wrestler passes above the other's right arm, his right arm under the other's left, and hands are then locked across the back. To break this hold is equivalent to defeat. This is the simplest and fairest style of W.; it is on the first down to lose principle. Any part (other than the feet) touching the ground means a fall. If both men fall the one first touching the ground is the loser. The style still flourishes in the N. Eng. cos., and, to a lesser extent, in parts of Scotland. The Japanese style of W., *Judo* (formerly *Ju Jitsu*), is more than a sport; it is a method of self-defence and originally a war exercise. It differs entirely from the national (professional) style called *Sumo*. Based on an accurate knowledge of anatomy, it includes much of ordinary W. with additions which admit of strangulation, dislocation of joints, and blows struck with the edge of the open hand. It has become very popular, as an exercise, throughout America and Europe. Catch as Catch Can includes all that the name implies, but a large number of punishing grips and moves are forbidden in order to exclude the use of brutal or dangerous tricks. It is correct to state that this style is practically universal; 27 nations were represented in the Olympic Games wrestling of 1948. Professional W. in the All-In style still exists on the Continent, in America, and Australasia, and to a diminishing extent in Britain. See G. Hackenschmidt, *Complete Science of Wrestling*, 1929; E. Gruhn, *Text Book of Wrestling*, 1930, 1947; H. A. Oberholzer, *Recreative Wrestling*, 1949; A. W. Umbach and W. R. Johnson, *Successful Wrestling*, 1953.

Wrexham, municipal bor. and mkt tn of Denbighshire, Wales. Its church of St Giles, rebuilt about 1470, is one of the 'seven wonders of Wales.' Industries include coal mining, brewing, tanning, and textiles. It is an agric. centre. Elihu Yale (q.v.), who was a patron of Yale Univ., is buried here. Pop. 32,400.

Wright, Sir Almroth Edward (1861-1947), physician, b. Middleton Tyas, Yorks; he studied at Trinity College, Dublin, and the univs. of Leipzig, Strasbourg, and Marburg. He was appointed demonstrator of pathology at Cambridge Univ., 1887; and in physiology at Sydney, 1889. He was prof. of pathology at the Army Medical School, Netley, 1892-1902. In 1902 he was appointed pathologist to St Mary's Hospital, where

in 1908 was created, under his direction, the dept of therapeutic inoculation, subsequently entitled the Institute of Pathology and Research. He was also prof. of experimental pathology in the univ. of London. W. was knighted in 1906. He was the originator of antityphoid inoculation, therapeutic inoculations for bacterial infection, and methods of measuring protective substances in human blood, which proved a great preventive to wound infection in the First World War. During the S. African War he was able to test the results of his laboratory work by immunising troops against typhoid fever; the results were most satisfactory, and similar results were obtained in India. See L. Colebrook, *Almroth Wright, Provocative Doctor and Thinker*, 1954.

Wright, Frank Lloyd (1869-), Amer. architect, b. Richland, U.S.A. who worked in various offices, including that of L. Sullivan (q.v.), and began practice in Chicago 1893. His buildings are mostly dwelling-houses, but also include the Unity Temple at Oak Park, the Midway Gardens Pleasance at Chicago, and the Imperial Hotel at Tokyo. It was partly the original character of his work that made him the leader among Amer. architects by the middle of the 20th cent.; but much of his wide influence internationally has been due to his numerous books, in which his ideas on architecture and sociology are expounded at some length. He was awarded the R.I.B.A. Royal Gold Medal in 1951. See his own *Autobiography*, 1932; a biography by his son John, 1946; a study by B. Zevi, 1947.

Wright, Joseph (1734-97), painter, b. Derby. He is known as 'Wright of Derby.' W. studied under Hudson and Mortimer in London, and returned to work in Derby as a portrait painter. He is best known for his paintings of scenes in which artificial lighting increases depth and contrast of light and shade.

Wright, Judith, see AUSTRALIAN LITERATURE.

Wright, Richard (1908-), Amer. novelist, b. near Natchez, Mississippi, son of a Negro. In 1938 he won a prize of \$500 with his novelette *Uncle Tom's Children*. Later he was awarded a Guggenheim Fellowship. In 1940 his story *Native Son* received the Spingarn Medal, highest award for work done in the Negro interest. *Twelve Million Black Voices*, 1941, is a history of the persecution of the Amer. Negro, and *Black Boy*, 1945, tells of his own youthful hardships. Later books are *The Outsider*, 1953, and *Black Power*, 1954.

Wright, Wilbur (1867-1912) and Orville (1871-1948), Amer. brothers of Dayton, Ohio, who invented the practical powered aeroplane. Influenced by the work and death of Lilienthal (q.v.), they made an exhaustive study of previous work in aviation, and in 1900 made the first of their 3 gliders. After perfecting their patented means of control (which consisted of warping the wing-tips in connection with a rear rudder, as well as using a front elevator for climb and dive)

they designed and built their first powered aeroplane, including the engine, in 1903, and on 17 Dec., near Kitty Hawk, N. Carolina, made the world's first powered, sustained, and controlled flights, Orville making the first and third flights of 4, Wilbur the others. Through a series of almost unbelievable circumstances their work for long remained unknown, despite flights of over 1 hr in their *Flyer No. 3* in 1905. They did not fly again until 1908, when Wilbur flew in public for the first time in Europe and Orville in the U.S.A. Their known work on gliders had already been the largest factor in developing European aeroplanes, and when they emerged in 1908 they further revolutionised aviation. They thereafter constructed many excellent aircraft. Their first *Flyer* (now called the Kitty Hawk) was the subject of a bitter quarrel in the U.S.A., and was sent to England, where it was on loan to the Science Museum, London, from 1928 to 1948. It is now in the National Air Museum, Washington.

Wright, Willard Huntington, see VAN DINE, S. S.

Wriothesley, Henry, third Earl of Southampton (1573-1624), courtier, Shakespeare's patron. He succeeded his father, the 2nd Earl, in 1581, and studied at Cambridge and Gray's Inn. From 1590 he was prominent at court, and Shakespeare dedicated *Venus and Adonis* and *Lucrece* to him. W. was involved in Essex's Irish conspiracy, and was sentenced to death. But the sentence was commuted to life imprisonment, and he was later freed by James I. He d. while serving in the Netherlands. See life by C. C. Stopes, 1921.

Wrist, or Carpus, that portion of the arm between the hand and the lower arm. The joint is made by the articulation of the ulna and radius with the carpal bones, 8 in number. The mobility of the joint is combined with a great degree of strength, so that dislocations and sprains are not common. Fracture of the lower end of the radius is known as Colles' fracture.

Writ: 1. In the literal sense of that which is written. W. is particularly applied to the Scriptures, or books of the O.T. and N.T., and again, in Scots law, the term is sometimes used to denote a writing, deed, or any legal instrument.

2. In Eng. law, a W. is a precept under seal in the name of some executive officer, such as the lord chancellor or a judge, having jurisdiction or authority in the particular matter, and directed to some public officer such as a county sheriff or to some private person, commanding him to do something in relation to a suit or action. In this sense a W. is a legal document which in effect is the first step in legal proceedings, civil or criminal (see SUMMONS). Some of the more important of the multifarious W.s in Eng. law are the W. to the county sheriff to elect a member of Parliament, a W. of habeas corpus (q.v.), and quo warranto (q.v.), W.s of subpoena ad testificandum, and subpoena duces tecum.

Writer's Cramp, see SPASM.

Writers to the Signet, see SIGNET.

Writing is the most important method of record-keeping and of communicating ideas or sounds of the human voice, by marks or significant and convenient symbols, painted or drawn, traced or incised, on paper, stone, metal, or any other material. W. is an integral part of our civilisation; it is, indeed, the main currency of civilisation. It is one of the main aspects of culture which clearly distinguish mankind from the animal world. W. is the graphic counterpart of speech: each element (written symbol or letter, or written word) in the system of W. corresponds to a specific element (sound or group of sounds, such as spoken words or syllables) in the primary system. Although writing is not considered a separate branch of learning, it forms the main basis for 2 important fields of study, epigraphy (q.v.) and palaeography (q.v.); and some of its sections form part of other depts of learning, e.g. hieroglyphics (q.v.) is part of Egyptology, and cuneiform W. (q.v.) is part of Assyriology.

Origin of Writing. We do not know the inventor of W., or when and where arose the knowledge of the art—and we may never know. It is probable that there were periods, ages long probably, during which perishable W. materials (e.g. bark or wood) were employed; we can dig up thousands of inscriptions (q.v.), but it will never be possible to recover earlier documents made of non-durable matter. Yet hist. naturally relates what we know (although there is no doubt that only an insignificant part of the story of mankind is known), and thus the hist. of W. must be based mainly on preserved documents. Many of the earliest records of men have been found in the drawings and paintings left by the cave-dwellers in S. France and in Spain. At some remote time, in the Upper Palaeolithic Age (belonging perhaps to 20,000 BC), primitive man drew pictures of the beasts on whose flesh he fed on the walls of his cave, and painted them with coloured earths and vegetable dyes. He also carved sketches on the bones of the animals he had killed, or upon rude stone surfaces. It is still uncertain, however, whether these realistic pictures represent the beginnings of art or of W., or of both. If these pictures or sketches were done not only for amusement in the long leisure hrs, but also for the perpetuation or transmission of thought, then they may represent the beginnings of W. It is, however, more probable that these paintings or sketches were done for purposes of 'sympathetic magic' or for ritual practices, and not because of the urge to record important events or to communicate ideas. The same may be said of the numerous riv. pebbles of the Azilian culture (Middle-Stone Age), painted with peroxide of iron, with dots and lines, etc.; also of the various 'petroglyphs', which are geometric signs or conventionalised figures of men, painted or engraved on rocks or on the stones of megalithic tombs and other Neolithic Age (q.v.) monuments, to be found in various

Mediterranean countries, and many others. If these prehistoric pictures and sketches do not represent the beginnings of W., then it is preferable not to attempt a chronological hist. of W., but to classify it according to its nature and to certain recognised terms, on the assumption that these terms indicate types of W. and stages of development which are not necessarily chronological.

Embryo Writing. Prehistoric man did not think about true W.; even nowadays there are primitive peoples who can do without it. Indeed, members of primitive tribes seldom venture beyond the natural boundaries of their tribal ter., and various acoustic and optic devices suffice for communication. Small communities of agric. peoples, living in vlls., have developed systems of communication based on the principles of sound or acoustics (war-cries of the Negritos of Luzon; whooping of Creek Indians in N. America, etc.). Pastoral peoples who live scattered over wide areas have developed optic devices of communications (smoke-and-fire signals of prairie tribes of S. America, or similar devices). The simplest form of optical communication is, of course, the gesture, which may be used not only to indicate single key-words representing numbers, objects, moods, or directions, but it may be perfected into an actual substitute for language, e.g. the gesture-language of deaf-mutes (see DRAF AND DUMB), or signalling methods used at sea or in the mts. As man rose from his primitive state towards civilisation, he must have felt a need for recording his knowledge in some permanent form, or of helping his memory in conveying an important message. Primitive systems of conveying ideas are found everywhere in anct. tradition, and some survive in use to-day. Herodotus (ii. 16) describes a 'letter' sent by the Scythians to the Persian king Darius; it consisted of a bird, a mouse, a frog, and 5 arrows; its meaning was as follows: 'Persians, can you fly like a bird, hide yourselves in the ground like a mouse, leap through swamps like a frog? If you cannot, then do not try to go to war with us; we shall overwhelm you with arrows.' Similar codes of tokens for sending messages are still found among various primitive peoples, such as the Niam-Niam (Upper Nile, Africa), the Batak of Sumatra, the Lu-tze on the Tibeto-Chinese frontier (a piece of chicken liver, 3 pieces of chicken fat, and a chili, wrapped in red paper, indicated 'prepare to fight at once'), and other tribes. The most interesting, however, are the symbolical epistles, *aroko* (= 'to convey news'), of the Yebu and other tribes in Nigeria. *Calumet*, the sacred decorated reed tobacco-pipe of N. American Indian tribes, was used as symbol of peace or war. Some Amerindian tribes used to send to the President of the U.S.A. a feather-trimmed ear of corn whose hollowed-out inner part was filled with tobacco, and around its centre a woollen cord was slung, also trimmed with yellow feathers: the message was a declaration of peace ('The pipe shall be

smoked by the President'). The *ndangas* and *bolongas* of the Bangala people (Upper Congo R.) should also be mentioned.

Pictography. While the primitive devices of communication, e.g. mnemonics (in which the employed symbols need the interpretation of the messenger), may be considered preliminary stages of W., pictography or picture-writing is the first stage of true W.: in this, the painted or drawn or traced pictures, known as pictograms, speak for themselves. Pictography (q.v.) may be subdivided into 3 classes:

(i) **Iconography**, which gives a static impression; the pictures are motionless, and they represent the things shown (the sketch of an animal would represent this animal, a circle might represent the sun, etc.). To-day, with action pictographs and motion pictures, comic strips and illustrations, the introduction of action into pictures seems a small thing; actually it was a very important development when the 'writer' began to 'write' picture-stories, i.e. when he began to make pictures tell stories. The most famed among the pictorial documents are those of the N. Amer. Indians, so beautifully described by Longfellow in *The Song of Hiawatha* (xiv).

(ii) **Ideography** (see IDEOGRAPHY). There thus arose the synthetic or ideographic writing; this can be best studied in the W.s of primitive tribes of to-day (in Polynesia and Australia, in W. Africa, in N. and Central America, among the Yukaghirs of NE. Siberia, etc.).

(iii) **Analytic Writing**. Neither iconographic W. nor synthetic W. constitutes a complete system of W., as is in fact the case of analytic W.s in which definite pictures, conventional and simplified, selected by agreement or custom from many experimental pictures, became fixed pictorial symbols, constantly used. Only 8 or 9 systems of W. belong to this category, the cuneiform W., the hieroglyphic and hieratic W.s, demotic W. (qq.v.), the scripts of the Indus valley people, of the Cretans, Hittites, Chinese, Mayas, and Aztecs, and probably also the mysterious Easter Is. W. These systems, however, are already partly phonetic, and are thus transitional between the pure pictographic and the phonetic W.

Phonetic Writing. It was a long way from the primitive pictography to the phonetic W. In pictography there is no connection between the depicted symbol and the spoken name for it. In phonetic W., which is the graphic counterpart of recording speech, each element corresponds to a specific element (i.e. sound) in the language to be represented. The first steps taken in phonetism may be found in the 'rebus,' in which the pictures of objects do not stand for the objects themselves, but for the sounds they recall, i.e. the pictures shown have names sounding like or similar to the word intended: Englishmen, for instance, could in this way represent the name Woodbury by a row of trees (forest, wood) and a picture of a berry. This evolution from concrete representation to abstract symbol—the

thing-picture and idea-picture turning into sound-picture—was part and parcel of the main analytic scripts (hieroglyphics, cuneiform W., Chinese W., etc., see above), which, however, are not pure phonetic W.s, because they continue to employ ideographs and word-characters. Pure phonetic W. may be syllabic or alphabetic.

Syllabary or Syllabic Writing is the less advanced stage of pure phonetic W. Syllabaries existed in ant. times, in Byblos (N. Syria), Assyria, Cyprus; 2 syllabaries derived from Chinese W. have become Jap. scripts; artificial modern syllabaries were, or still are, employed in Africa, N. America, and in China. In syllabic W.s the single symbols represent syllables generally, or vowels, when these constitute syllables.

Alphabetic Writing is the last and most highly developed system of W.; its development constitutes a story in itself (see ALPHABET).

The development of cursive W. is dealt with in the article PALAEOGRAPHY. The origin and the development of the numerals, and the hist. of abbreviations and of stenography, are other problems connected with W. (see ABBREVIATIONS; NUMERALS; SHORTHAND).

See J. G. Février, *Histoire de l'écriture*, 1948; O. Ogg, *The 26 Letters*, 1949; J. E. Lips, *The Origin of Things*, 1949; D. Diringer, *The Alphabet: a Key to the History of Mankind* (4th Impr.), 1953.

Writing, Epistolary, see LETTERS.

Wrocław: 1. Prov. (*województwo*) of SW. Poland, bordering in the W. on Germany, and in the S. on Czechoslovakia. It is crossed SE-NW. by the fertile valley of the Oder (q.v.). In the SW. are ranges of the Sudetic Mts (q.v.). Other rivs. of importance are the Bobrawa (q.v.) and the Kwis. Until 1945 the ter. of the prov. was in Ger. Lower Silesia (q.v.); the Ger. pop. was expelled after the Second World War. Live-stock is raised, and cereals, potatoes, and flax are grown. There are metal, textile, engineering, glass, and paper industries. Coal, galena, and other minerals are found, and there are sev. spas. Area 7320 sq. m.; pop. 2,000,000.

2. (Ger. Breslau) City of Poland, cap. of W. prov., on the Oder at the mouth of the Olawa, 190 m. WSW. of Warsaw (q.v.). It became the seat of a bishopric in the 10th cent., and after 1163 was the cap. of a duchy of Silesia (q.v.). It was razed by the Mongols in the 13th cent., was rebuilt by Ger. settlers, and became a member of the Hanseatic League (q.v.). In 1526 it went to the Hapsburg (q.v.) family, but was ceded to Prussia in 1742. In 1813, during the Napoleonic Wars, it was for a time the Prussian H.Q. Until 1945 it was the cap. of Ger. Lower Silesia. It suffered severely during the Second World War, particularly in the 9 weeks' siege by the Soviet armies in 1945. When it fell to the Russians on 12 May 1945 about two-thirds of the city was in ruins. The Oder divides W. into an old and a new tn.; these with their many suburbs are connected by sev. bridges. There are

many old churches, including an archiepiscopal cathedral which dates from the 13th cent. The tn hall was begun in the 14th cent. There is a univ., an airport, and a riv. port. Textiles, machinery, chemicals, foodstuffs, pottery, and tobacco are manuf. Pop. 374,000 (including many post-war immigrants from Lgov and Vilna).

Wrong, George Mackinnon (1860-1948), Canadian historian, b. Elgin co., Ontario, and studied at Toronto Univ. After a course at Wycliffe Hall he was ordained in the Church of England in 1883. He accepted a lectureship in hist. at Toronto Univ., where he proved a successful and popular teacher; he was prof. of hist. at the same univ. from 1894 until his retirement in 1926. W. was especially noted for his writing on the hist. of Fr. Canada. Chief works: *The British Nation, a History*, 1903, *The Rise and Fall of New France*, 1928, *Canada and the American Revolution*, 1935, and *The Canadians, the Story of a People*, 1938.

Wrought Iron, see IRON AND STEEL.

Wroxeter, vil. of Shropshire, England, on the Severn, where it is crossed by Watling Street, 7 m. ESE. of Shrewsbury, was the tribal cap. of the Cornovii, and later as Viroconium an important tn in the urb. life of Rom. Britain. It was the fourth-largest tn in Rom. Britain with an area of some 170 ac. Epigraphical and literary evidence points to its foundation about AD 48 as a legionary camp (or possibly fortress) in the campaigns of Ostorius Scapula against the Welsh, and it so continued until under Agricola the Fourteenth and Twentieth Legions were transferred to Chester. It was, apparently, after this that it became the tribal cap. of the Cornovii who had been forced to leave their own hill-city on the Wrekin. The imposing forum was built by AD 130, and followed by a basilica and other public buildings on a grand scale. Much of the tn was destroyed by fire about AD 300. There was subsequent rebuilding of public and private buildings on a smaller scale, and a considerable occupation well into the 4th cent. Excavations were made between 1912 and 1937. The chief remains now to be seen are parts of the forum and basilica, and of the great public baths. The site is protected as an ainct monument, and a museum is maintained. See *Research Reports of the Society of Antiquaries, Wroxeter I*, 2, 3, 1913-16, *Archaeologia*, vol. 88 (1938), 175.

Wryneck, genus (*Iijna*) of small birds of the *Picidae* or woodpecker family, of which only 4 species are known, 3 of which are peculiar to Africa. These are *I. pectoralis* (S. Africa and the Congo), *I. pulchricollis* (Upper White Nile), and *I. aequaliorialis* (Ethiopia). The fourth species, *I. torquilla*, is the common wryneck of Europe. Its general colour is brown and grey with black markings; its length 61 in. It sometimes runs up trees exactly like a true woodpecker. Its name is derived from its habit of twisting its neck as it picks up ants or other insects.

Wyszowa (Ger. *Fraustadt*), tn of Poland, in Zielona Góra prov., 28 m. E. by S. of

Zielona Góra (q.v.). In 1706 Charles XII (q.v.) of Sweden gained a victory here over the Saxons. The tn is a centre of a dist. producing sugar beet. Pop. 5000.

Wu Ching-tzu, see CHINESE LITERATURE.

Wuchin, see CH'ANGCHOW.

Wuchow, or T'sangwu, former treaty port of China, on the confluence of R.s Hsün and Kwei, in the prov. of Kwangsi. It is the distributing centre between Canton, Kwangsi, and Kweichow, and exports sugar and various oils. Pop. 90,000.

Wuhan, the triple city on the Yangtse, cap. of Hupei prov., China, comprising the former cap. Wuchang, the port Hankow (q.v.), and the heavy-industry city Hanyang. The NW. bank of the Yangtse at this point is divided into 2 halves by the R. Han, which joins the Yangtse. Wuchang is situated on the SW. bank and the other 2 occupy the corners of the 2 right angles on the other side of the Yangtse. The triple city is linked together by 2 bridges crossing both rvs., built in 1957. In Wuchang there is the National Wuhan Univ., its palatial buildings on top of the Lochia Hill overlooking the E. Lake. The old city wall along the riverside is built partly on Tortoise and Serpent Hills; on top of the wall is the Yellow Crane Tower. Wuchang was the scene of the first revolution which broke out on 10 Oct. 1911, resulting in the overthrow of the Manchu gov. and thereby putting to an end the 2000-year system of monarchy in China. In 1927 the first National Gov. was set up in Wuchang. The first modern iron and steel works began operation at Hanyang in 1890, but it soon fell into disuse. Work was resumed in 1951. W. is now being developed into a heavy-industry centre of Central China, comparable to that in Manchuria. Its light industry, first developed in 1890, has earned W. the name of 'China's Chicago.' The city is served by the Peking-Hankow and Canton-Hankow trunk railways, the Wuchang-Tayeh branch line, and regular airliners to Peking, Canton, Shanghai, and Chungking. Pop. 1,750,000.

Wuhu, former treaty port of China, in the prov. of Anhwei, on an affluent of the Yangtse. It exports rice, cotton, tea, etc. It is also a manufacturing tn, and is noted for its cutlery and steel articles. Pop. 136,000.

Wulfia, *Ulfilas*, *Ulfilas* ('little wolf') (c. 311-385), translator of the Bible into Gothic. Consecrated bishop in 348, he was expelled by his heathen compatriots from his native place, and sought refuge in Lower Moesia, where he remained for 30 years. In 385 he went to Constantinople (which he had visited in 360 for a council), and d. there shortly afterwards. He was one of the chief supporters of Arianism. His greatest work, however, is his Gothic trans. of the Bible, a work which fixed the Gothic language and perpetuated Christianity among the Gothic people. See also GOTHIC LANGUAGE AND SCRIPT. See study by C. A. Scott, 1885.

See also H. M. Gwatkin, *Studies of Arianism*, 1882; G. H. Balg, *Ulphilas*, 1891.

Wulfrundhamton, see WOLVERHAMPTON.

Wulfstan, Wulstan, or Wolstan, St (c. 1012-95), prelate, b. Long Itchington, Warwickshire. He studied at Evesham and Peterborough abbeys. He became a Benedictine at Worcester, and Bishop of Worcester in 1062. Wm I allowed him to retain his see, though an Englishman. W. rebuilt Worcester Cathedral. He was canonised in 1203 and his feast day is on 19 Jan. (See also under WORCESTER.)

Wundt, Wilhelm (1832-1920), Ger. physiologist and psychologist, b. Neckarau, Baden. He studied medicine at Tübingen, Heidelberg, and Berlin, at which univ. he qualified in 1857. He worked for a time with Helmholtz and, after an interval due to ill health, became successively prof. of physiology at Heidelberg (1864), of inductive philosophy at Zurich (1874), and of philosophy at Leipzig (1875). He founded the Institute of Experimental Psychology at Leipzig in 1879, with himself as director; it was the predecessor of many similar institutes. W. did more than anyone else to establish psychology as a serious subject for scientific instruction and research. He considered human knowledge to be built upon simple sensations and feelings, the study of which would reveal the elements of all knowledge and lead to a complete understanding of its structure. He wrote a text-book of human physiology, 1865, and 3 important memoirs on muscular motion, 1858, sensory perception, 1862, and nerves and nerve-centres, 1871-6. His *Grundzüge der physiologischen Psychologie*, 1873-4, was a model text-book; other psychological works were *Logik*, 1880-3, *Ethik*, 1886, and *Völkerpsychologie*, 1904-10. For biography see E. G. Boring's *History of Experimental Psychology*, 1929.

Wuppertal, Ger. tn in the Land of N. Rhine-Westphalia (q.v.), in the valley of the Wupper, 17 m. E. of Düsseldorf (q.v.). It was formed in 1929 by the amalgamation of the tns of Barmen and Elberfeld, and various other smaller communities, including Cronenberg, Vohwinkel, Ronsdorf, and Beyenburg. The tn. which is enclosed by wooded heights, was severely damaged during the Second World War. There is a textile industry which dates from the Middle Ages and is said to owe its location here to the special qualities of the Wupper water for bleaching. There are also dyeing, machinery, metal goods, chemical, electrical, rubber, and brewing industries, and the tn. is a printing and publishing centre. Pop. 402,400.

Württemberg, former rep. (until 1918 a kingdom) in SW. Germany, bounded on the E. by Bavaria and on the W. by Baden (qq.v.). Hohenzollern (q.v.) formed an enclave in the SW. of its ter. W. was colonised by the Romans. The counts of W. obtained possessions in Swabia (q.v.) on the death of Conradin V (q.v.). These possessions were gradually increased, and in 1495 W. became a duchy. In 1806 Napoleon created a

kingdom of W., which lasted until 1918, when William II of W. abdicated and a rep. was proclaimed. Under the National Socialist regime it was governed by a *Statthalter*. After the Second World War part of W. was combined with dists. of Baden to form the Land of W.-Baden (area 5960 sq. m.; pop. 3,875,000; cap. Stuttgart) in the Amer. zone of occupation; the remainder of the ter. was combined with Hohenzollern to form the Land of W.-Hohenzollern (area 4017 sq. m.; pop. 1,119,000; cap. Tübingen) in the Fr. zone. In 1952 these two Länder became part of the new Land of Baden-W. (q.v.).

W. was for the most part mountainous, the chief ranges being the Swabian Jura, which crossed the rep. SW.-NE., and the Black Forest, which lay on the W. frontier. It was watered by the Danube and the Neckar (qq.v.). Agriculture was the chief occupation of the inhab., but there were many industries, including the manuf. of textiles, iron and steel goods, and beer. There was an important univ. at Tübingen (q.v.). The pop. was predominantly Protestant, a minority of some 30 per cent being Rom. Catholic. Area 7534 sq. m.; cap. Stuttgart (q.v.); pop. (1940) 2,696,300.

Würzburg, Ger. city in the Land of Bavaria (q.v.), on the Main (q.v.), 136 m. NW. by N. of Munich. It was originally a Celtic settlement. Its bishopric was founded by St Boniface (q.v.). Charlemagne (q.v.) held court in the city, and Frederick I (q.v.) was married in it in 1156. It was occupied by the Swedes under Gustavus II (q.v.) in 1631, but the prosperity it had enjoyed during the later Middle Ages revived after the end of the Thirty Years' War (q.v.). In 1945, during the Second World War, it suffered severe damage in a bombing attack. The Marienberg fortress, built on a height on the l. b. of the riv., was formerly the castle of the prince-bishops; it has an 8th-cent. chapel. In the 18th cent. it was superseded as the episcopal residence by a magnificent baroque palace, which contains, among its many treasures, frescoes by Tiepolo (q.v.). Of the city's many fine churches, the most notable is the Romanesque cathedral (1034); it has baroque additions, and has sculpture by Tilman Riemenschneider (q.v.). There is a remarkable 15th-cent. bridge, with 12 baroque statues of saints. The univ. dates from 1582; among its professors have been Schelling, Döllinger, and Röntgen (qq.v.). W. is an important railway junction, is the centre of a famous wine-producing dist. (*Steinwein*), and has machinery, chemical, metal, and paper manufs. Pop. 97,000.

Wusung: 1. Tn of China, in the prov. of Kiangsu, near Shanghai, at the mouth of the Wusung R.

2. Riv. of China, which rises in Lake Tai, flows eastward, joins the Hwangpu by cutting through the N. part of Shanghai, and finally flows N. to enter the Yangtse estuary just below Wusung.

Wyandots, formerly large tribe of N. Amer. Indians, known also as Hurons.

They were discovered on the St Lawrence R. by the first Fr. explorers, with whom, notably with Champlain, they speedily formed an alliance. The Fr. Jesuits maintained flourishing missions among them, until the tribe was destroyed by the Iroquois (q.v.) in 1648-9. In 1600 there were perhaps 10,000 Huron and 8000 Tionontati in the W. confederation, but to-day there are about 800 in Oklahoma and 400 in Canada.

Wyandotte, city in Michigan, U.S.A., on Detroit R. 12 m. SW. of Detroit. It manufs. chemicals (based on local salt deposits), metal toys, and rubber and dairy products, and there is a shipbuilding industry. Pop. 36,800.

Wyandotte Cave, natural formation in Crawford co., Indiana, U.S.A., containing a greater number and variety of stalactites and stalagmites than any other cave in the U.S.A. It has miles of passages on 6 levels.

Wyatt, James, P.R.A. (1746-1813), architect, and son of an architect; studied in Italy c. 1762-8. His first known building was the Pantheon in Oxford Street, London (1770, since demolished). He designed many other important buildings in the classical style, including Heaton Hall, Lancs; Heveningham Hall, Suffolk; Castle Coole, Ireland; Roehampton Grove, Surrey; and two colossal Gothic mansions—Ashridge Park, Herts, and Fonthill Abbey, Wilts. He acquired the nickname of 'The Destroyer' for his drastic restoration of Durham, Hereford, Lichfield, and Salisbury cathedrals, Westminster Abbey, and Magdalen College at Oxford. His son Benjamin W. (1776-1850) and his distant cousins Thomas Henry W. (1807-80) and Sir Matthew Digby W. (1820-77) were also leading architects. See biographies by A. Dale, 1936, and R. Turnor, 1950.

Wyatt, Sir Thomas (1503-42), courtier and poet, b. Allington Castle, Kent. Educ. at St John's College, Cambridge, he was one of the most accomplished men of his day and was held in high favour at court. For a time he appears to have shared the disgrace of Anne Boleyn, being imprisoned for a short time in the Tower and afterwards banished to Allington Castle. He was, however, frequently employed later by the king in positions of trust. In 1540 he received a grant of lands at Lambeth and sat in Parliament as knight of the shire for Kent and was named high steward of the king's manor at Maidstone (1542). His poems were pub. with Surrey's in London (1557), and some of them are remarkable for their grace and elegance. His satires, too, are worthy of mention; but he is chiefly remembered as the pioneer of the Eng. sonnet. In his poetry he is indebted to Chaucer, through whom he harks back to the poetry of medieval England. Some of his lyrics show Fr. influence, though it is rather as the disciple of the Italians, Petrarch, Aretino, and Serafino that W. opens a new era in Eng. poetry. See E. M. W. Tillyard, *The Poetry of Sir Thomas Wyatt*, 1929; K. Muir, *The Collected Poems of Sir Thomas Wyatt*,

1949; also study by E. K. Chambers, 1934.

Wyatt, Sir Thomas (d. 1554), soldier, son of the above. He served at the siege of Landrecies in 1544, and 10 years later was the leader of a plot to prevent the marriage of Queen Mary to Philip of Spain. He raised the Kentish men and marched on London, but was captured and beheaded.

Wyatville, Sir Jeffry, R.A. (1766-1840), architect, b. Burton-on-Trent, son of an architect, and nephew of James W. (q.v.) and Samuel W., both architects. Working first in Samuel's office and then in that of James, he began independent practice in 1799, with great success. He built, altered, or extended a large number of country mansions, but is best known for his work at Windsor Castle, where he remodelled the Upper Ward and heightened the Round Tower, 1824-50. King George IV, in recognition of this work, allowed him to change his name to 'Wyatville' in 1824, and knighted him in 1828. He made Windsor Castle much more comfortable, but destroyed some of the fine rooms decorated in the time of Charles II.

Wycherley, William (1640-1715), dramatist, b. Clive, near Shrewsbury, the son of a loyal Shropshire gentleman of good family. On the outbreak of the Civil war he sent W. to be educ. in France. On the Restoration W. went to Queen's College, Oxford, and left without a degree; he was then entered at the Temple, but preferred a gay social existence and the writing of plays to law studies. His first play, *Love in a Wood*, produced in 1671, was followed by *The Gentleman Dancing-Master*, 1671-2, and *The Country Wife*, 1673, a masterpiece of Eng. comedy only excelled, if at all, by *The Plain Dealer*, 1673 or 1674, which was inspired by Molière's *Misanthrope*. W.'s *Miscellaneous Poems* are forgotten. He was privately married to the Countess of Drogheda, a step that seems to have given offence at court. The marriage, owing to Lady Drogheda's violent jealousy, was unhappy. W.'s plays are all of them ingeniously constructed, the situations are amusing, the characters well drawn, and the dialogue witty and sparkling. He was the moralist of his age, making immorality appear ridiculous, and a thorough misanthrope. The best collected ed. of W.'s works is that by M. Summers (4 vols.), 1924. See B. Dobrée, *Restoration Comedy*, 1924; W. Connelly, *'Brawny' Wycherley*, 1930.

Wycliffe (spelt also Wyollif, Wioflif, Wicliffe, etc.), John (c. 1324-84), scholar and reformer, b. Yorks, possibly at Hipswell. He studied at Oxford, and some time after 1356 became Master of Balliol College; while there W. accepted a living at Fillingham, Lincs (1361), and in the same year appealed unsuccessfully for a papal provision to a prebend at York but obtained a prebend in the collegiate church at Westbury. In 1373 he received a papal licence to retain his prebend there even after he should have obtained one at Lincoln. He had become

a doctor of theology in 1372. In 1374 he became rector of Lutterworth, and soon afterwards retired from Oxford, living mainly in Lutterworth until his death.

As Master of Balliol and a prominent Realist, W. took part, on the side of the seculars, in the Oxford controversy between the secular clergy and the mendicant orders (who followed the Nominalist school of philosophy). W. also established himself as a critic of clerical abuses.

In 1374 he was sent to Bruges in the delegation which discussed the question of papal provisions with papal representatives. After his return he wrote his treatise *De Dominio*. W.'s Realist speculations led him to a belief in predestination, and in the light of this he went on to define lordship. Eventually he decided that the Church had no right to interfere in temporal affairs and denied its right to temporal possessions. Though W. never suggested a spoliation of the Church, such a move was the logical conclusion of his theory, and aroused the hostility of the regular and secular clergy. It fitted conveniently with the views of the Lollardians, for it insisted that lay lords had a right to property although churchmen had not, a proposition in support of which W. had to summon all his resources of scholastic dialectic to avoid being obviously illogical. The general theory may well have had a quite unintended influence in the Peasants' Revolt (1381), since the landless would see no reason to distinguish finely between eccles. and civil lordship.

In 1377 W. was summoned to answer charges of heresy before the Bishop of London, but his Lollardian patrons ensured that the meeting ended inconclusively. Bulls were issued against his theories on the relations between Church and State, but seem to have had only negligible effect. He was still supported by his univ., which found him convenient as an additional weapon in its administrative dispute with the episcopal authorities. With the papal schism of 1378, W. took a more revolutionary attitude towards the Holy See, being convinced that its powers were responsible for the disorders of the Church. He challenged the claims of the papacy by asserting that papal decrees were binding only when in conformity with the word of God. Violent attacks on the abuses of sanctuary and pardons (made by the most orthodox) were followed by his Eng. trans. of the complete Bible. He began to turn to the Scriptures as the criterion of Christian doctrine, a practice followed by later reformers. His organisation of itinerant 'poor priests' propagated his beliefs. Soon he was questioning the sacerdotal system, and, by 1380, setting aside the doctrine of transubstantiation in the Mass in favour of something approximating to the later Lutheran doctrine of consubstantiation.

This last conclusion branded W. as a heretic. It sprang directly from his scholastic Realism, and its attendant theology of universals. His heretical views lost him the active support of the Lan-

castrians, whose prestige, however, was sufficient to enable him to end his days in peace. They were officially condemned at Oxford, and never seem to have had any considerable following in England. Their violence secured the failure of the more orthodox aspects of his teaching. After his death Lollardy was eradicated from Oxford by Arundel and Courtenay, and with it the last brilliance of the medieval univ.

In England his movement *d.* soon after his death. It survived longest among the poorest classes in the Midland dists. The fall of Oldcastle and a series of burnings under the statute of 1410 apparently suppressed the remnants. In Europe, however, W. influenced Huss (q.v.), who, however, never adopted his heretical ideas on the Mass. Through Huss he probably influenced Luther. W. had shown scholasticism to be played out; his extreme conclusions illustrated clearly the practical dangers of hair-splitting dialectic. Though his desire for practical reforms was sincere and justified, he is important largely as a destructive force.

After W.'s example, the Eng. church became afraid of reformers, and viewed the most orthodox suggestions with suspicion. Faithful enthusiasts, from Bishop Pecock to Margery Kempe, were suspected of heresy. Fear of a fresh heretical outburst caused future vernacular trans. of the Bible to be discouraged, and real abuses were allowed to remain. The radicalism of W.'s teaching, therefore, led to a certain crystallisation of Eng. eccles. life, which made the religious revolution, when it came, more sweeping than it might otherwise have been.

See also LOLLARDS. See G. V. Lechler, *Wyclif and his English Precursors* (Eng. trans. 1878); R. L. Poole, *Illustrations of the History of Medieval Thought in Theology and Ecclesiastical Politics*, 1884, and *Wycliffe and Movements for Reform*, 1889; H. Rashdall, *Universities of Europe in the Middle Ages* (vol. II), 1895; G. M. Trevelyan, *England in the Age of Wyclif*, 1899; J. Loserth, *Hus and Wyclif*, 1925; H. B. Workman, *Wyclif*, 1926; W. Butler Bowden (ed.), *The Book of Margery Kempe*, 1936; H. Maynard Smith, *Pre-Reformation England*, 1938; A. Gwynn, *English Austin Friars in the time of Wyclif*, 1940.

Wycombe, High, municipal bor. and mkt tn in Buckinghamshire, England, at the foot of the Chiltern Hills. Furniture making is a major industry; recent developments have also brought in light industries, and postage stamps are printed and paper-making carried on. The fine par. church dates from c. 1275, but it was considerably altered and enlarged in the 15th and 16th cents. The tn contains numerous old houses of the 17th and 18th cents. The Little Market House was built in 1761, and the Guild Hall dates from 1757. The ruined hospital of St John dates from c. 1180; it was converted into a grammar school in 1550. Wycombe Abbey, erected by Lord Carrington in 1795, is now a girls' school. Pop. 41,890.

Wycombe, West, vil. of Buckinghamshire, England, now forming part of the bor. of High Wycombe. Most of the vil., which contains many 17th- and 18th-cent. buildings, belongs to the National Trust. The latter also owns West Wycombe Park, 2 m. W. of High Wycombe on the Oxford Road. On the hill is a curious church, built in 1763, surmounted by a golden ball capable of holding 12 persons, which has associations with Sir F. Dashwood.

Wycombe Abbey School, Buckinghamshire, public school for girls, founded 1886. It stands in extensive grounds.

Wye: 1. Riv. of Welsh border country, which rises in Plinlimmon, and after a course of 130 m. enters the Severn 2½ m. from Chepstow. It has valuable salmon fishery, and is noted for its scenic beauty. See R. Gibbings, *Coming Down the Wye*, 1942.

2. Vil. in Kent, England. Wye Agricultural College and a church rebuilt by Archbishop Kempe in the time of Henry VI are here. Pop. 1500.

Wykeham, William of (1324-1404), Eng. bishop, b. Wickham, near Farcham. He was educ. at the old grammar school at Winchester. W. took deacon's orders at an early age, but was not ordained priest until 1362. In 1364 he became keeper of the privy seal; in 1366 he was appointed Bishop of Winchester, and in 1367 he became lord high chancellor of England, holding office till 1371. Winchester College and New College, Oxford, were founded by him, the former being finished in 1394 and the latter in 1386; he also rebuilt part of Winchester Cathedral. W. was a sound administrator, and a keen builder. He was one of the *episcopi curiales* and was not distinguished as a spiritual leader. See life by G. C. Heseltine, 1932.

Wylde, Henry Cecil Kennedy (1870-1945), philologist and lexicographer, b. of a Scottish family and educ. at Charterhouse, Bonn, Heidelberg, and Corpus Christi College, Oxford (1886-9). He was prof. of Eng. language and literature at Liverpool Univ. (1904-20), and subsequently Merton prof. of Eng. language and literature at Oxford. His pubs. embrace phonetics, comparative philology, dialects, place names, rhymes, and the like. He also ed. *The Universal Dictionary*, 1932.

Wyllie, Elinor (1885-1928), Amer. novelist and poetess, b. Somerville, New Jersey, daughter of Henry M. Hoyt. She married successively Philip Eichborn, Horace Wyllie, and William Rose Benét. Her poems, which combine fantasy with a fine craftsmanship, include *Incidental Numbers*, 1912, *Nets to Catch the Wind*, 1921, *Black Armour*, 1923, *Trivial Breath*, 1928, and *Angels and Earthly Creatures*, 1929. *The Orphan Angel*, 1926, is a novel about Shelley, for whom she had a great admiration. Others are *Jennifer Lord*, 1923, *The Venetian Glass Nephew*, 1925, and *Mr Hodge and Mr Hazard*, 1928. See study by N. Hoyt, 1935.

Wyllie, Ida Alexa Ross (1885-), Australian novelist, b. Melbourne. She was educ. at Brussels, Cheltenham, and

Karlsruhe, and lived in Germany till 1911. Her novels include *Towards Morning*, 1920, *The Silver Virgin*, 1929, *To the Vanquished*, 1934, *Furious Young Man*, 1935, *A Feather in her Hat*, 1937, *Where No Birds Sing*, 1947, and *Candles for Therese*, 1951. She was even more popular as a writer of short stories, collections of which are *Happy Endings*, 1915, *Armchair Stories*, 1916, *All Sorts*, 1919, *Some Other Beauty*, 1930, and *Storm in April*, 1946.

Wyllie, Philip Gordon (1902-), Amer. novelist, b. Beverly, Massachusetts. He was educ. at Princeton, then after various types of work became a writer and was editor of the *New Yorker*. His most controversial book was *A Generation of Vipers*, 1942, which criticised Amer. civilisation and popularised the word 'momism,' meaning sentimentalisation of motherhood. Other novels are *Gladiator*, 1930, *Footprint of Cinderella*, 1931, *The Savage Gentleman*, 1932, *An April Afternoon*, 1938, *The Other Horseman*, 1941, *Night Unto Night*, 1944, *Opus 21*, 1949, and *To-morrow*, 1953. He also wrote a series of books about fishing.

Wymondham, mkt tn and agric. centre of Norfolk, England. The magnificent church of St Mary the Virgin comprises part of the priory founded at W. in 1107, and there is also an interesting old mkt cross. Pop. 6000.

Wynants, Jan (c. 1620-c. 1680), Dutch painter, probably b. Haarlem. He worked exclusively on landscape subjects, the figures and animals in his pictures often being painted by other artists. W. had a meticulous style, and his work possesses a clear, bright tone.

Wynberg, residential suburb of Cape Town, S. Africa. There is a well-known military camp near by.

Wyndham, Sir Charles (né Culverwell) (1837-1919), actor, b. Liverpool and educ. at Bonn and Paris for the medical profession. In 1865 he appeared in Manchester in the role of Charles Surface. In 1884 the Criterion Theatre (q.v.) was re-opened under his management. In 1899 and 1903 he opened his own theatres, Wyndham's (q.v.) with *David Garrick* and the New Theatre (q.v.) with *Rosemary*. He was first 'the irresistible young escapee' and then 'the blithe middle-aged homilist.' He was knighted in 1902.

Wyndham, George (1863-1913), politician and man of letters, b. London, was educ. at Eton and Sandhurst. For a short time he served in the Coldstream Guards, and saw service at Suakin in 1885. He resigned in order to enter political life, and in 1898 became Under-Secretary for War. In 1900 he was made Chief Secretary for Ireland, and 2 years later entered the Cabinet. He represented Dover in the Conservative interest from 1889 till his death. He also gained distinction as a scholar and critic. His pubs. include *Ronsard and La Pléiade, With Selections from their Poetry and some Translations*, 1906, and *Sir Walter Scott*, 1908. See J. W. Mackail and Guy Wyndham, *Life and Letters of George Wyndham*, 1925.

Wyndham-Quin, Windham Thomas, see DUNRAVEN and MOUNT EARL.

Wyndham's Theatre, London, named after Sir Charles Wyndham (q.v.) and opened in 1899. It was associated for many years with Sir Gerald du Maurier. Notable productions include *Mrs Dane's Defence*, 1900, *Diplomacy* (revival), 1913, *Dear Brutus*, 1917, *The Ringer*, 1926, *George and Margaret*, 1937, *Quiet Weekend*, 1941, and *The Boy Friend*, 1954.

Wynkyn de Worde, see WORDE.

Wyntoun, Andrew of (c. 1350-c. 1420), Scottish chronicler, prior of the monastery of St Serf on Lochleven. He wrote *The Orygynale Cronykil of Scotland*, a work in 8 books or cantos, the last 4 of which are devoted to Scottish hist.

Wynyard, Diana (1906-), actress, b. London. She studied under Gwen Lally and Kate Emil Behnke and made her first appearance on the stage at the Globe Theatre, where she walked on in *The Grand Duchess* in 1925. From 1926 until 1927 she played many parts on tour. She joined the Liverpool Repertory Company, 1927-9; then she came to the St Martin's Theatre, London, and made successes in *Sorry You've Been Troubled* and *Petticoat Influence*. *Sweet Aloes* at Wyndham's, 1934, which ran for over a year, put her right in the front rank of Brit. actresses. Since then she has had a brilliant and successful career. She has been leading lady at Stratford-on-Avon and toured Australia with the Shakespeare Memorial company; her performance as Beatrice in *Much Ado About Nothing* at the Phoenix in 1952 was particularly memorable. Her brilliant film career includes such outstanding films as *Cavalcade* and *Rasputin*. She received the C.B.E. for services to the stage, 1953.

Wyoming, mt. mid-western state of the U.S.A., bounded N. by Montana, E. by S. Dakota and Nebraska, S. by Colorado, SW. by Utah, W. by Idaho. It is known as the 'Equality State.' W. is part of a lofty plateau of about 6000 ft above sea-level traversed by mt ranges, including the whole breadth of the Rocky Mt system. Its length E. to W. is 356 m., N. to S. 278 m. Area 97,914 sq. m. Gannett Peak, highest point of Wind R. Range, is 13,785 ft. Yellowstone Park is situated in this state, and is noted for its marvellous scenery and geysers. Yellowstone, Bighorn, and Powder R.s flow E.; Snake R. rises in the N. W. has great mineral wealth: coalfields, silver, gold, copper, petroleum, and iron ore. The quarries yield sandstone, limestone, and phosphate rock. Dry farming is carried on. The state's total farm land is 33,000,000 ac., most of it devoted to sheep and cattle raising. With over 1,000,000 head of cattle and c. 3,500,000 sheep and lambs, W. is a leading livestock region, ranking second to Texas. The crops are alfalfa, sugar-beet, vegetables, and small fruits, also apples.

Certain varieties of wheat and barley flourish. Much of the land is forested. The state owns numerous fish hatcheries. Manufs. in W. are not very important, being mainly for local consumption; industries include petroleum refining, lumber and timber products, dairy products, flour and grain, slaughtering and meat-packing.

There is a large irrigated area, much desert land being thereby rendered fertile, with over 2,000,000 ac. already under irrigation. Reclamation works include Pathfinder, Seminole, and Guernsey dams on the North Platte R. The climate is good, the atmosphere being clear and dry. There is abundance of sunshine, and the state has in consequence become a favourite health resort, particularly for people suffering from lung trouble. There is a state univ. at Laramie. Prin. cities are Cheyenne, the cap., 31,935; Casper, 23,673; Laramie, 15,581; and Sheridan, 11,500. W. was first settled in the 17th cent. by Spaniards. John Colter discovered Yellowstone Park in 1807. In early days there was much fighting with the war-like Indian tribes. There was a great rush of emigrants on discovery of gold in the early seventies. W. was admitted to the Union in 1890. It was the first state in the U.S.A. to grant women's suffrage (1869). Pop. (1950) 290,529. See F. B. Beard, *Wyoming from Territorial Days to the Present*, 1933; Federal Writers' Project, *Wyoming*, 1941; V. Linford, *Wyoming: Frontier State*, 1947.

Wyoming Valley, crescent-shaped valley 20 m. long, 3-4 m. wide, in Luzerne co., Pennsylvania, U.S.A., with rich deposits of anthracite coal; it is noted for its scenery. The massacre of Wyoming, the subject of Campbell's poem, took place here (1778).

Wyrtegeorn, see VORTIGERN.

Wyss, Johann Rudolf (1781-1830), Swiss author, b. Bern. He was prof. of philosophy at Bern Univ. from 1806. He was the author of the national hymn, *Rufst du, mein Vaterland*, 1811, but is best known in Eng.-speaking countries for his novel, *Der schweizerische Robinson*, 1812-13, trans. as *The Swiss Family Robinson* in 1820.

Wyszyński, Stefan (1901-), Polish cardinal b. Zuzela; educ. at Lublin univ. and ordained priest in 1924. After serving as rector of the seminary and canon of the cathedral at Włocławek, W. was consecrated Bishop of Lublin (1946). In 1948 he was appointed Archbishop of Gniezno and Warsaw and Primate of Poland. On the eve of his elevation to the Sacred College in 1953, W. was imprisoned by the Communist gov. of Poland, and was not released until 1956. In 1957 he visited Rome, where the Pope conferred upon him the Red Hat.

Wythenshawe, residential dist. of Manchester (q.v.).

X

X, twenty-fourth letter of the Eng. alphabet, may be considered as redundant: indeed, it can well be denoted by the consonants *ks* or *cs*. This letter did not exist in the N.-Semitic alphabet, but when the Greeks took over this alphabet they had no use for all the Semitic sibilant letters, and having adopted the Semitic *shin* as *s*, they gave it the name *sigma*, which apparently was a transformation of the letter-name *samekh* (perhaps by metathesis, from an Aramaic form, otherwise unknown, *sinkha*). The letter *samekh* was adopted in the Thera and Etruscan alphabets, but in the Ionic alphabet (which later became the classical Gk alphabet) it was given the phonetic value of *x* (*ks*) and the name *xei*. According to some scholars, however, the Gk *xei* had not the phonetic value of *ks*, but was merely a guttural aspirate, equivalent perhaps to Scottish *ch*. After the Romans adopted the Etruscan alphabet (which had no *x*) they added *x* to represent the sound *ks*, placing it at the end, for it did not then include *y* and *z*. The *X* passed with the other Lat. letters into the Eng. alphabet, where it retains the same sound (*ks*). The interchanges of *x* with other letters are as follows: (1) *x* with *c*, as in the double form of the Lat. or Gk preposition *ex* or *ec*; (2) *x* with *sc* or *sk*; (3) *x* with *g*, as in Lat. *augeo* compared with the Gk *auxanō*; and *mis-gnumi* compared with *mix*, Eng., and *mis-tus*, Lat.; (4) *x* with *ps*, as the Lat. *exilis* compared with the Gk *psilos*. See ALPHABET.

Xanten, Ger. tn in the *Land* of N. Rhine-Westphalia (q.v.), near the l. b. of the Rhine, 33 m. NNW. of Düsseldorf (q.v.). It dates from Rom. times, and was a tn of importance in the Middle Ages. During the Second World War it was very severely damaged. Its massive Gothic cathedral was begun in 1190. *X* was the bp. of St Norbert (q.v.), and, according to legend, it was the home of Siegfried (see NIBELUNGENLIED). Pop. 5000.

Xanthine (2 : 6-dioxypurine), $C_4H_4N_4O_2$, uric acid or purine derivative, is a white powder, slightly soluble in water. It occurs in the blood, in urine, and in tea, and may be prepared by reducing uric acid with sodium amalgam.

Xanthus, anct city of Lycia. It stood on the W. bank of the riv. of the same name. Twice in the course of its hist. it sustained sieges which terminated in the self-destruction of the inhab. with their property, first against the Persians under Harpagus, and afterwards against the Romans under Brutus. The city was never restored after its destruction on the second occasion. *X* was rich in temples, tombs, and other monuments.

Xáves, see JAVEA.

Xavier, Francis, St (1506-52), Sp. Jesuit missionary, patron of the foreign missions and 'the Apostle of the Indies,'

b. at the castle of Javier, in Navarre. At the univ. of Paris he met Ignatius Loyola (q.v.) with whom he was associated in the formation of the Society of Jesus (1534). He was ordained in 1537, and for some years preached in Rome. In 1540 he sailed for the E. Indies as a missionary. After having made converts in Goa, Malacca, Travancore, the Banda Is., the Moluccas, and Ceylon, he founded a mission in Japan (1549-51), where, 40 years after his death, it has been estimated that there were 400,000 Christians. For a long time he was forbidden to enter China, and he d. at Sanchian, near Canton, when he had at last received permission to preach in that country. *X* was one of the greatest of all missionaries; he was favoured with extraordinary graces and great practical ability. He was canonised in 1622; his feast-day is on 3 Dec. His letters were pub. in 1631. See *lives* by Mary McClean, 1896, and E. A. Stewart, 1917.

Xenogamy, see ALLOGAMY.

Xenon (Gk, 'a stranger'), symbol Xe, atomic number 54, atomic weight 131.3, heaviest of the argon group of inert gases (q.v.), obtained by Sir William Ramsay (q.v.) by the fractional distillation of liquid air. It is present in the atmosphere to the extent of 1 part in 20,000,000. The spectrum of *X*. shows prominent red and blue lines in the intermittent discharge, but with the 'jar' discharge green lines take the place of the red and blue. See INERT GASES.

Xenophanes (fl. 540-500 BC), Gk philosopher and poet, the founder of the Eleatic school. He was b. at Colophon in Ionia, but settled in Elea, S. Italy, where he wrote sev. elegiac poems, and one poem in hexameters *On Nature*, of which fragments remain. See T. Bergk (ed), *Lyrici Graeci*, 1900; J. Burnet, *Early Greek Philosophy* (4th ed.), 1943; J. E. Raven, *Pythagoreans and Eleatics*, 1948.

Xenophon (c. 430-c. 356 BC), Gk historian and Athenian gen., b. Athens. He was a friend and disciple of Socrates. In 401 X. entered the service of the Persian prince, Cyrus the Younger, who was fighting his sovereign and elder brother, Artaxerxes Mnemon. The Gk officers were treacherously killed after the battle of Cunaxa, and X., with great courage and skill, led the retreat from the Tigris to Trapezus, on the Black Sea. A hist. of the expedition is given in his *Anabasis*. He enlisted his soldiers in the service of Lacedaemon (399). In the latter year, or very soon afterwards, X. was banished from his home, either on account of his Spartan sympathies or because of his friendship with Socrates. In 396 he joined the Spartan army, and fought under King Agesilaus at Coronela (394). He was rewarded with an estate at Scillus. Following the renewal of an alliance between Athens and Sparta (371), the decree of banishment against X. was repealed

(369), but he is said to have lived for the rest of his life at Corinth. Besides the *Anabasis*, he wrote a life of Agesilaus; *Hellenica*, a hist. of Greece from 411 to 362 BC; *Memorabilia*, *Apologia*, *Oeconomicus*, and *Symposium*, all of which are expositions of the teachings of Socrates and attempts to vindicate his old teacher and friend; *Hiero*, a dialogue on tyranny; *Cyropaedia*, a political romance; *On Horsemanship*; *Hipparchicus*, on the responsibilities and powers of a cavalry officer; *Cynegeticus*, on hunting; *The Lacedaemonian Constitution*; and *The Athenian Revenues*. The complete works of X. have been ed. by E. C. Marchant (5 vols., 1900-19), and trans. by H. G. Dakyns (1890-94). There are numerous eds. and trans. of separate works and groups of works. See H. Richards, *Xenophon and Others*, 1907.

Xeres, see under JEREZ DE LA FRONTERA.

Xerophytes, plants which live and thrive where water is difficult to obtain, and which are adapted to hot and dry climates, e.g. Cacti.

Xerxes, King of Persia (485-465 BC.), b. c. 519 BC, son of Darius Hystaspes and Atossa, daughter of Cyrus the Great. Prior to his accession X. had been 12 years Viceroys at Babylon. After ascending the throne he suppressed revolts in Egypt and Babylon. He then set out against Greece, at the head of a vast army, which he led across the Hellespont on a bridge of boats (480). Another great feat was the construction of a canal through Mt Athos. He marched S. without meeting resistance until he reached Thermopylae, where he defeated Leonidas and his handful of Spartans. X. then marched through Phocis and Boeotia and at length reached Athens, while his fleet, battered in storm and action, arrived in the Bay of Phalerum. He destroyed Athens and then decided to risk a naval battle with the Athenians, but his mighty armament was defeated and dispersed at Artemisium and Salamis (480). Fearful now for his own safety, he left Mardonius (q.v.) with a large army to complete the subjugation of Greece and, with the rest of his force, retreated homewards, entering Sardis at the end of the year (402). In 479 Mardonius was defeated at Plataea by the Greeks, and at the same time the Persians were also defeated at Mycale in Ionia. Finally, the Greeks gained another victory on the banks of the Eurymedon (466), as a result of which the Persians lost all their W. possessions outside Asia Minor bequeathed to them by Darius. X. was assassinated by Artabanus in 465.

Ximenes (or Jimenes) de Cisneros, Francisco (1436-1517), Sp. cardinal and statesman, b. Torrelaguna, Castile. He studied at Alcalá de Henares, Salamanca, and Rome, and was ordained priest. In 1480 he was appointed grand-vicar of Sigüenza by Cardinal Mendoza. Two years later X. took Franciscan vows, and became confessor to Queen Isabella in 1492. The queen appointed him Archbishop of Toledo in 1495, and on her

death he was appointed regent (1506) to the mad Queen Joanna. He founded the Univ. of Alcalá de Henares (c. 1498), organised the preparation of a new Polyglot Bible (1514-17), and did his utmost to reform monastic life. In 1507 he became a cardinal, and in 1509 led in person an expedition against Oran in Africa. On the death of Ferdinand he again acted as regent (1516-17). See Gomez de Castro, *De Rebus Gestis Francisci Ximenii*, 1569. See also lives by J. Ulrich, 1883, and J. P. R. Lyell, 1917.

Xiphonia, see AUGUSTA.

Xlathros, see ZUSUDRA.

Xochimilco, tn of Mexico, 12 m. SSE. of the cap., with Aztec remains. Its floating gardens built on chinamoas are famous. Pop. 14,400.

Xosa, see AMA-XOSA. In 1818 the 2 sections of the tribe under Ndlambe and Ngqika fought a great battle and have since been separate. See J. H. Soga, *The Ama-Xosa*, 1932.

X-rays were discovered by Röntgen (q.v.) in 1895 during some experiments on electric discharges through highly evacuated tubes. He employed a fluorescent screen covered with barium platocyanide in order to detect the presence of ultra-violet light and discovered that his screen continued to fluoresce even when the discharge tube was completely covered with opaque paper; further, he found that heavy objects interposed between the tube and the screen stopped the fluorescence. It was clear, then, that some kind of radiation was emitted from the tube that could penetrate opaque paper and cause the screen to fluoresce, and that this radiation was absorbed by heavy objects. Being ignorant of the nature of this radiation, Röntgen called it X-rays.

Methods of Production. Intensive research on X-rays followed Röntgen's discovery, and the best method of producing these rays was gradually evolved. Until 1913 the most satisfactory X-ray tube was of the design shown in Fig. 1.

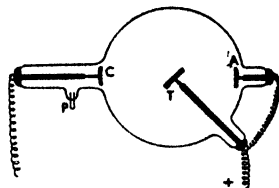


FIG. 1

EARLY DESIGN OF X-RAY TUBE

C is the cathode, made of aluminium, concave in shape in order to focus the cathode rays (q.v.) on the metal plate T, known as the target. This target is the anode, but it is found that the discharge takes place more steadily when there is a second anode A present. The target is the source of the X-rays and, as it gets

very hot, it is made of a metal such as tungsten which has a high melting-point. The tube is fairly highly evacuated, requiring a potential difference of about 40,000 volts between the anode and the cathode in order to produce a discharge. The source of this potential difference is the secondary of a transformer or induction coil, the primary of which is connected to a battery of a few accumulators. In course of time the residual gas is occluded by the glass walls, and in order to restore the tube to its former condition the palladium tube *P* is gently heated by means of a Bunsen burner. The palladium tube is gas-tight when cold, but lets hydrogen through quite freely when hot, so that traces of free hydrogen in the Bunsen flame find their way inside the bulb. This type of tube has been displaced by the Coolidge tube, which is vastly superior to its predecessor, both in point of steadiness of running and in the 'hardness' or penetrating power of the X-rays it emits. The Coolidge tube, in-

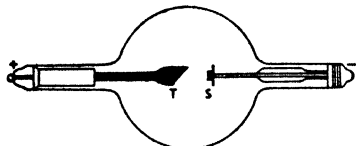


FIG. 2
THE COOLIDGE TUBE

vented in 1913, is shown in Fig. 2. The tube is highly evacuated, the pressure inside being of the order of 10^{-4} mm. of mercury. The source of the electrons is the flat spiral *S* of tungsten that is heated by means of a small battery of accumulators. The spiral is surrounded by a short tube of molybdenum, and this serves to focus the cathode rays on the adjacent target *T*. The latter is made of tungsten and is sometimes water-cooled, or cooled by exterior fins. The great advantage of the Coolidge tube over the older type lies in the fact that the source of electrons is independent of the potential difference between the anode and the cathode. Thus the stream of electrons can be increased or decreased by adjusting the current through the spiral, while the hardness of the X-rays can be increased by increasing the potential difference between the anode and the cathode. The most satisfactory source of potential difference is a transformer working with an interrupter, and a potential difference of about 70,000 volts is commonly used with these tubes.

Nature and Properties. X-rays are electromagnetic waves (q.v.), identical in character with wireless waves and light waves, but differing in degree, being extremely short waves. The softest or least penetrating X-rays have wavelengths of the order of 2×10^{-8} cm., while the hardest rays produced by the

Coolidge tube are as short as 6×10^{-10} cm. Their peculiar properties are due to the fact that their wavelengths are so minute. They can penetrate bodies opaque to ordinary light because the distance between the atoms of the body is of the same order as the wavelength of the X-rays (see DIFFRACTION). The absorption of X-rays by bodies depends on the nature of the atoms of which the body is constituted; the heavier the atoms, the greater the absorption of X-rays. A thin sheet of lead, for example, will absorb an appreciable amount of a hard beam of X-rays that will penetrate several ft. of wood. A beam of X-rays passing through a human body is less readily absorbed by the flesh than by the bone; hence if a fluorescent screen is placed behind the body the bones will be revealed by the 'shadows' they cast on the screen that is illuminated more intensely behind the fleshy parts. Permanent X-ray records of an examination are obtained by replacing the fluorescent screen by a photographic plate which is sensitive to X-rays. The modern Coolidge tubes reveal the internal structure of the human body in some detail. Closer examination of the organs is achieved by making the patient consume food containing salts of bismuth or barium, as these are relatively opaque to X-rays.

Radiotherapy. X-rays have important applications in therapy as well as in diagnosis. They are used in the treatment of many kinds of cancer because malignant cells are more readily destroyed by X-rays than are normal cells. They are also used for certain skin diseases. Radioactive substances, e.g. radium (q.v.), are also used for radiotherapy, and the action of some of them depends on the gamma-rays, i.e. very hard X-rays, that they emit.

Origin of X-rays. The X-rays are generated by the impact of the high-speed electrons on the target of the X-ray tube. If such an electron penetrates an atom of the target and is deflected by the nucleus (q.v.) of the atom, it cannot take up a permanent residence in one of the inner electronic orbits of the atom, since these are already occupied, unless another electron is ejected. Two things may happen: (a) the electron may disturb the electron configuration and even eject an electron from an inner orbit; (b) it may itself escape with reduced energy after its collision. The remainder of its energy appears as X-radiation, sometimes called *Bremsstrahlung* or 'braking radiation' because the electron is slowed down. The greatest possible frequency of the X-radiation emitted occurs when the electron loses all its energy; the quantum theory (q.v.) then tells us that the frequency of the X-radiation is given by the equation $h\nu = h\nu_0$, where m is the mass of the electron, v its original velocity on impact, and ν is the frequency of the X-radiation; h is Planck's constant (see QUANTUM THEORY). This result agrees with experimental determination of the wavelengths of X-rays by measuring the diffraction caused when the X-rays pass

through a crystalline substance. Bremsstrahlung consists of a range of frequencies up to the maximum ν , but the radiation consequent upon the rearrangement of a distorted electron configuration consists of discrete frequencies, i.e. a line spectrum, on the continuous Bremsstrahlung spectrum.

X-ray Spectroscopy. In 1921 von Laue suggested that a crystal would act as a diffraction grating for X-rays. A crystal is a conglomeration of atoms arranged on a regular plan at extremely short distances apart—about 10^{-8} cm.—so short indeed that one would naturally expect them to show diffraction for very short waves. The method developed by von Laue in Germany was improved by W. H. and W. L. Bragg in England, and much knowledge has been acquired concerning X-ray spectra as well as important information on the structure of crystals. When a beam of X-rays falls on a crystal and passes through it the transmitted and diffracted beams can be recorded on a photographic plate. Measurement of X-ray wavelengths are made by the rotating-crystal method originated in 1913 by the Braggs, by the powder photograph, the X-ray spectrometer, the Laue photograph, etc., but a description of these is impossible in the limited space, and readers should refer to specialised textbooks for further information on the subject.

Industrial Applications of X-rays are almost unlimited in their range. Whenever and whenever it is highly important to probe the interior of a finished article of manuf. without damaging it in any way, recourse is made to X-ray examination. Modern techniques include the use of gamma-rays (q.v.), the hard X-rays produced by radioactive atoms, many of which are artificially produced, e.g. the isotope of cobalt, Co^{60} . Hidden fractures in metal castings or weldings; defective golf balls and glasses; the discrimination between real and artificial gems; the examination of leather and the fit of boots and shoes: all these are revealed by routine X-ray examination, while fraudulent paintings alleged to be 'old masters' are detected at once by such an examination that has also proved its value in detecting alterations to genuine masterpieces. Application has also been made to the studies of rubber and fibres. X-ray diffraction patterns of rubber for unstretched rubber indicate a random structure, but a definite pattern is revealed for stretched rubber. On releasing the tension, the rubber returns to its amorphous state, suggesting a random arrangement of irregularly coiled chains of isoprene units. Wool and hair show that the protein, keratin, consists of a chain of amino-acid residues, the chains being linked by sulphur atoms. This is apparent

in both the stretched and unstretched cases. The pattern for silk shows that the essential constituent is the protein, fibroin, consisting of glycine and alanine residues. X-rays have been used in collaboration with the electron microscope and standard chemical and spectrographic techniques for the study of large molecules. See W. H. and W. L. Bragg, *X-rays and Crystal Structure*, 1924; 1927; W. L. Bragg, *Atomic Structure of Minerals*, 1937; E. G. Cooper, *Scientific Instruments*, 1946; Kathleen Lonsdale, *Crystals and X-rays*, 1948; B. L. Worsnop and F. C. Chalkin, *X-rays*, 1950.

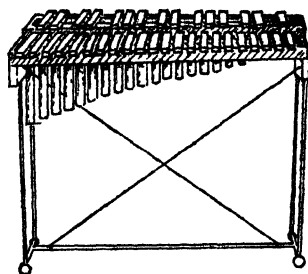
Xucar, see JUCAR.

Xylography, see BLOCK-BOOKS.

Xylol, commercial name given to the mixture of xylenes obtained from coal-tar. Xylene, or dimethylbenzene, $\text{C}_6\text{H}_4(\text{CH}_3)_2$, exists in *orthometa*-, and *para*-isomeric forms, and the 3 are similar in physical properties (boiling point $138-143^\circ\text{C}$.).

Xylonite, see CELLULOID.

Xylophagidae, family of flies which suck the juices of plants and the sap of trees.



XYLOPHONE

Xylophone, percussion instrument with a series of wooden sticks or plates tuned in a chromatic scale ranging from middle C about 3 octaves upwards in foreign instruments, but in Eng. ones often only from B \flat above middle C. It is played with hammers and makes a dry, rattling, but perfectly clear and richly sonorous sound.

Xystus, in Classical architecture, an enclosure, colonnade or portico, used for athletic exercises and recreation.

X Y Z Correspondence. President Adams of the U.S.A. used this term in the Congress reports on the letters of Marshall, Pinckney, and Gerry, who were ambas. to Talleyrand in France during a period of strained relations between the U.S.A. and France, 1797-8, and who reported that 3 Fr. agents, to whom they referred as X, Y, and Z, had offered them bribes.

Y

Y, twenty-fifth letter of the Eng. alphabet, has here the phonetic value of a consonantal *i*: with this sound it is familiar to the English as the beginning of words, as in *yes, young, yoke*. This sound, however, was written in Latin by *i*, e.g. *iugum* or *IVGVM*, but when transliterated in modern letters this *i-consonantal* sound is not represented by *i* or by *y*, but by *j*: *iugum* or *IVGVM* is now written *jugum*. A further complication arises in English when the sound *y* is followed by a long *u*: the letter *y-j* is then omitted, and we write *union, unity, useful*.

There was no Y in the N.-Semitic alphabet. When the Greeks borrowed it they transformed a form of the Semitic *waw* into the vowel *u*, which they called *upsilon*, but pronounced it like the Fr. *u* or the Ger. *ü*. The Etruscans took over the *upsilon* (then having the form *V*) as the vowel *u*, and passed it over as such to the Romans, who used it, however, as *v* or *u*. After the Roman conquest of Greece (2nd cent. BC), Gk words were largely borrowed by the Lat. language, and the symbol Y was adopted for the Gk sound *u-v* from the contemporary Gk alphabet in order to transliterate Gk words; it was placed after the letter X. Thus the words in which the *y* occurs are not really part of the Lat. language, but are borrowed from the Greek, e.g. *zeephyrus*. Such forms as *lachryma, hyems, sylva* are errors of modern editors. The Romans themselves wrote *lacruma* or *lacrima, hiems* or *hiemps, and silva*. In A.-S. the sound of a *y* was commonly represented by an *e* before *a* or *o*, and by an *i* before *e* or *u*, in which cases the allied languages of Iceland, Denmark, and Sweden for the most part employed a *j*. See ALPHABET.

Y-Alloy, an aluminium base casting alloy containing 4% copper, 2% nickel, and 1.5% magnesium. It can be hardened by quenching from about 500° C. and reheating at about 170° C. The alloy is used where excellent high-temp. properties are required, i.e. in internal-combustion engines for pistons and cylinder-heads. See ALLOY.

Yablonovyy, range of mts in Transbaikalia (q.v.), dividing it into W. and E. parts; length nearly 1000 m. The highest peak is Mt Sokhondo, 8050 ft.

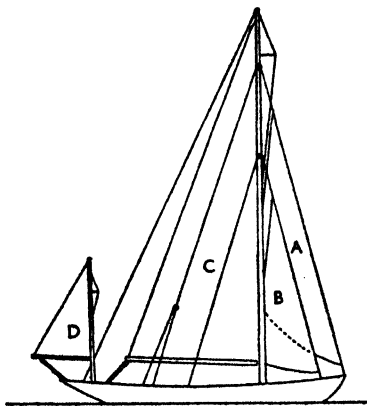
Yacht, generally a vessel used for pleasure-cruising or racing. The first Brit. Y.s were the *Mary* and *Bezan*, both presented to Charles II by the Dutch at his Restoration. Eng. shipwrights were at once set to improve on the Dutch models and were able to do away with the Dutch lee-boards and build Y.s of deeper draught. On 1 Oct. 1661 Pepys, an early convert to yachting, tells how Charles, in the new *Katherine*, raced with the Duke of York, in the new *Anne*, from Greenwich to Gravesend and back for a wager of £100, the first recorded Y. race

sailed in Eng. waters. Soon other wealthy men began to own Y.s. In 1720 the first Y. club was founded in Cork, and in 1775 the Cumberland Fleet, or Sailing Society, was founded, the ancestor of the present Royal Thames Y. Club. Gradually there have evolved types of craft, moderate in size and capable of travelling all over the world. Y.s fall naturally into 2 classes, viz. sailing Y.s and power-driven Y.s, sailing Y.s being capable of further subdivision into cruising and racing types. Power-driven vessels are the more costly to buy, but are more easily handled, and are used mainly for cruising. Steam-engines were the first mechanical means used for the propulsion of Y.s, but the introduction and development of the internal-combustion engine have been responsible for their replacement by engines of the latter class. Small vessels now being constructed are, as a rule, driven by petrol or paraffin engines, whilst Y.s of the larger sizes are almost invariably engine by 'Diesels' or 'semi-Diesels'. When sailing Y.s are designed for cruising it is usual to install an auxiliary engine for use when entering and leaving harbour or when conditions are unsuitable for sailing.

Sailing vessels are described by the manner in which they are rigged. To-day the old-fashioned gaff mainsail is seldom used by either racing or cruising Y.s. Instead almost all sailing Y.s have tall masts and tall, narrow, triangular mainsails, which offer a long leading edge of sail to the wind and are very efficient for windward work. Modern Y.s, too, are generally without a bowsprit, and set a variety of headsails from the stem head, which are graded according to the strength of wind and conditions of sailing. As well as jib and forestaysail, Eng. Y.s set a Yankee (masthead jib, once called a jib-topsail) and a Genoa (large jib of light canvas); and both these sails can be sheeted home and used for windward work. A parachute spinnaker is set when running before the wind; it is the shape of an isosceles triangle, and is hoisted before the forestay and has a short spinnaker boom which is hooked into the appropriate clue, or lower corner, according to the side on which the sail is to be carried. To combine lightness with strength, masts and spars are hollow, and masts are carefully stayed. Nylon is beginning to replace hemp, cotton, and flax for both rope and sails. The commonest rig for Brit. Y.s is the cutter, which has a single mast, and whose working canvas consists of a mainsail, forestaysail, and jib. Yawls and ketches add a small mizen mast, stepped in the stern abaft the sternpost in the yawl and before the sternpost in the ketch. Larger sailing Y.s are rigged as schooners, with 2 or more masts. In the schooner the mainmast is the aftermost of the 2 masts, is

stepped nearly amidships and is a taller mast than the foremast. Schooners have bermudan or gaff mainsails but often carry staysails, in place of bermudan or gaffsail, between the masts.

In 1875 the Y. Racing Association was estab. to govern the conditions of racing. Since that date Y. racing has become increasingly a popular sport, and racing Y.s have undergone many changes. We have already noticed the general adoption of the bermudan rig; equally noticeable is the much smaller average size of racing Y.s. Rising building costs and improvements in design, necessitating frequent new building if an owner is to remain successful, have encouraged smaller Y.s.



YAWL

A, jib; B, staysail; C, mainsail;
D, mizzen.

Thus many of the bigger classes, as was the J-class, which included King George V's *Britannia*, have now been either entirely or virtually abandoned. Yet racing in the smaller classes is so keen that probably the sport has never before attracted so many amateurs. Indeed, there are so many one-design classes in use round the coast that it is only possible to mention those which have a national or an international status. The lightest racing craft are the sailing canoes, but their numbers are few compared with the dinghies. Three large classes are the International 14-ft dinghy class, the National 12-ft dinghy class, and the National Firefly 12-ft one-design dinghy class. As well as being comparatively inexpensive and easy to maintain in racing trim, these dinghies give superb sport and school first-class helmsmen and helmswomen. Larger racing Y.s recognised by the International Y. Racing Union and popular in Great Britain are the International 6-metre class and the International Dragon one-design class.

In recent years a new form of Y. racing has attracted more and more attention

and is known as off-shore or ocean racing. The yearly programme caters for different sizes of Y.s, and the courses are of various lengths. Typical courses are from Harwich to the Hook of Holland, Cowes to Dinard and St. Malo, Plymouth to La Rochelle, and from Portsmouth round the Fastnet and back to Plymouth. These races test seamanship, navigation, and Y. construction in all weathers. Although special Y.s are built for this ocean racing, and the Royal Ocean Racing Club have racing rules, it is still possible for cruising Y.s. to win events, and, indeed, cruising Y.s. and ocean racing Y.s. cannot be treated separately. A remarkable feature of recent years has been the number of small cruising Y.s which have been sailed by amateurs across the Atlantic, or home from the E. across the Indian Ocean and up the Red Sea and through the Mediterranean, or right round the world. The Brit. entry for the America's Cup (q.v.) was the International 12 metre Y. *Sceptre*, having a lead keel and a 90 ft alloy mast, built at Sandbank, Argyll, and launched in April 1958.

Many handsome, comfortable, and seaworthy motor cruising Y.s will be found all round the coast. Some are conversions and others are standard types. Popular for family summer holidays are the so-called fifty-fifty, which are motorboats with sufficient sail to be able to make passages under sail alone in fair winds. H.M.Y. *Britannia* (4000 tons) was built to replace the *Victoria* and *Albert*. She was completed in Jan. 1954, and can be converted into a hospital ship. The ship has an overall length of 412 ft and the complete bridge structure and funnel are of aluminium. The *Britannia*, which is the only R.N. ship to be commanded by an adm., has been much used by H.M. the Queen and other members of the Royal Family. Early in 1957 the ship returned from a world cruise, during most of which H.R.H. Prince Philip was on board. During the cruise, the *Britannia* steamed 39,500 miles, rounded both the Cape of Good Hope and Cape Horn, and visited such out-of-the-way places as the Falkland Is. Dependencies, South Georgia, Tristan da Cunha, and St. Helena.

See E. G. Martin, J. Irving, and others, *Cruising and Ocean Racing*, 1933; K. A. Coles, *Sailing Days*, 1944; P. Heaton, *Sailing*, 1949; B. Heckstall-Smith and E. du Boulay, *The Complete Yachtsman*, 1949; E. C. Hiscock, *Let's Go Cruising*, 1949, and *Cruising Under Sail*, 1950; J. H. Illingworth, *Offshore, A Complete Introduction to Ocean Racing*, 1949.

Yadar, see JADAR.

Yagnavalkya (fl. c. 350), Hindu sage. He was responsible for a code of laws which is regarded by the Hindus as one of the sacred books.

Yahgans, see FURGANS.

Yahweh, see JEROVAH; JAHVIST.

Yahwist, see JAHVIST.

Yak, or Grunting Ox (*Polphagus grunniens*), large Tibetan ox which exists both in the wild and domesticated state. Two of its chief characteristics are the fringe of

long, pendulous hair along each flank and the huge whisk of hair at the end of the tail. In summer the coat is a deep, rich brown; the horns are black, large, and strong. The distinction between wild and domesticated Y.s is the grey hair on the nostrils of the former. They can live at very high altitudes, and the domesticated animal is used as a beast of burden and yields milk and meat.

Yakima, city of Washington, U.S.A., cap. of Y. co., on the R. Y. It is the centre of an agric. area, converted from desert by irrigation. There are canning and timber manufs. Pop. 38,486.

Yakö, a Negro people of the Cross River region of E. Nigeria. They dwell in 5 large vills., growing yams and forest crops. They, like the Herero (q.v.) of SW. Africa, reckon descent in both the male and female lines. Each person belongs to a patrilineal and a matrilineal clan, each being exogamous; land and immovable property are inherited in the former, while movable property passes down the female line. Each clan has its elders and priests. *See* D. Forde, *Marriage and Family among the Yakö of South-eastern Nigeria*, 1941.

Yakutia, Autonomous Rep. in E. Siberia, mountainous in the E., S., and W., lowland in the N. and centre, traversed by R.s Lena, Yana, Indigirka, and Kolyma, largely covered by coniferous forests, and having an extremely cold climate (*see* VERKHNOYANSK). There are large coal, iron-ore, gold, and diamond deposits. Activities include gold and coal mining, live-stock breeding, grain growing, and fur trapping. The prin. tns are Yakutsk and Aldan. Y. is an area of banishment (since the 19th cent.) with labour camps, and is the site of important construction projects. Area 1,182,300 sq. m.; pop. (1956) 483,000, mostly Yakuts and Russians (since 17th cent.). *See* W. Kolarz, *Russia and Her Colonies*, 1952.

Yakuts (own name Sakha), Turkic-speaking people living in the Lena basin and adjacent areas of E. Siberia, the most numerous of the N. peoples of Russia (241,000 in 1926). They are sedentary, mostly live-stock breeders. They have been known since the 14th cent., when they came from the S. and exterminated, expelled, or conquered the previous Tungus and Paleo-Asiatic (q.v.) inhab. The Y. have been subject to Russia since the 17th cent.

Yale, Elihu (1648–1721), patron of Yale Univ. (q.v.). He was b. at or near Boston, Massachusetts, entered the service of the East India Company (1672), and became governor of Fort St George, Madras (1687). He gave £800 and books to the collegiate school at New Haven, and the whole univ. was called after him. He is buried at Wrexham, Wales.

Yale University, one of the 2 oldest and most famous univs. in the U.S.A. (the other being Harvard), is situated at New Haven, Connecticut. It was founded by 10 Connecticut Congregational ministers with a gift of books at Branford, Connecticut, in 1701, and was first called the Collegiate School of the Colony. In

1718 it removed to New Haven and became Yale College, taking the name of Elihu Yale (q.v.), its first great benefactor. More books were secured for it by Jeremiah Dummer, the Colony's agent in London; Bishop George Berkeley gave his valuable library and his farm in Rhode Is. The rent from it provided the young college its first funds for study beyond the bachelor's degree. Its first permanent building, Connecticut Hall, was erected in 1752 and still stands. Schools of medicine, law, and divinity were estab. in the early 19th cent., and at the same time Benjamin Silliman began his pioneer work in the teaching of science. The first art gallery connected with a college in America was built at Yale in 1832, where John Trumbull's paintings of the Revolutionary War are housed. The Ph.D. degree was first granted in America by Yale in 1861. The schools of fine arts, music, and forestry came later; a School of Nursing (for women) was estab. in 1923 by gifts of the Rockefeller Foundation.

Undergraduates as freshmen (about 1000) live together on the Old Campus. In their 3 upper class years they live in 10 residential colleges, each accommodating 250–300. This residential college plan, preserving in a large univ. the values of a small college, was made possible by the gift of Edward S. Harkness ('97), in 1930. The bequest of John W. Sterling ('64), in 1918 provided many professorships and scholarships and buildings, notably those for the schools of medicine, law, and divinity, and the Sterling Memorial Library (approximately 2,849,945 vols.). The Yale Libraries contain more than 4,100,000 vols., with yearly accessions of 100,000 vols., and are especially strong in Amer., Eng., and Ger. literature, linguistics, the hist. of medicine and of the Church. There are famous collections in the Art Gallery and the Peabody Museum of Natural Hist. Before the Second World War there were 5300 candidates enrolled for degrees and a faculty of 1000. After the war the number of students reached nearly 9000 and the faculty 1400. Both figures are now somewhat less. Schools of instruction include the Undergraduate Schools, Graduate School, School of Medicine, Divinity School, Schools of Law, Engineering, Fine Arts, Music, Forestry, and Nursing.

Yale and Harvard athletic contests began with boat races in 1852, and have continued regularly since then, except during wars. The Payne Whitney Gymnasium has facilities for many kinds of competitive sport. Yale alumni are especially well known as first presidents of American colleges—Princeton, Dartmouth, Columbia, and many others. There were 24 Yale members of the Continental Congress and 4 Yale signatories to the Declaration of Independence. The endowment of the univ. in 1956 was more than \$130m.

Yalta, tn on S. coast of Crimea, 55 m. E. of Sevastopol. Since the 1880's it has been the main centre of the Crimean health resorts (c. 300,000 tourists and

patients yearly). There is a famous botanical garden in Nikita near by (founded 1812). Pop. (1956) 34,000. Y. was an anct Gk colony. The Y. Conference took place in nearby Livadiya in 1945.

Yalta Conference, conference held in Feb. 1945 in Yalta between Churchill, Roosevelt, and Stalin to make plans for the final defeat and occupation of Germany. The W. Allies secured Stalin's promise to enter the war against Japan, but the U.S.S.R. did not declare war until 8 Aug., 6 days before Japan's surrender. On the whole, Stalin secured great advantages for the Soviet Union at little cost.

Yalu, riv. of Asia which forms a boundary line between Korea and Manchuria. It rises in Paiktu-San, and after a course of 300 m. empties itself into Korea Bay, near Hsinyichow. It was the scene of sev. skirmishes during the Russo-Jap. war (1904).

Yam, edible tuberous root of many species of Dioscorea, much grown in tropical countries, where it takes the place of the potato. Some species yield tubers of enormous size.

Yama, in Hindu mythology, judge and ruler of the departed. He is represented as of a green colour, with red garments, crowned, 4-armed, and sitting on a buffalo. He holds a club and noose, with which the soul is drawn from the deceased's body.

Yamagata, city of Yamagataken, Japan; seat of the prefectural gov. It is the centre of a large rice-producing dist., and is famous for its cast-iron products. Pop. 160,000.

Yamal, peninsula in the Kara Sea (q.v.), with the adjacent mainland area forming Y.-Nenets National District, constituted 1930, belonging to the Tyumen' Oblast (q.v.). Area of the District 258,800 sq. m.; pop. c. 50,000, mostly Russians (since 16th cent.) and Nenets (q.v.). There are fishing, reindeer raising, and fur trapping. The cap. is Salekhard. It is an area of banishment and labour camps. *See also* MANGAZEYA.

Yangtsekiang, riv. of China, the greatest in that country and the fourth largest in the world. Its source is in the Payon Kara Mts of the K'un-lun system in SW. Chinghai. It originates in a number of dashing torrents which are more than 16,000 ft above sea-level. It flows in an easterly direction through E. Tibet and Yunnan, and turning N. forms part of the boundary line between that prov. and Szechwan. At this stage it receives the waters of the R. Min from the N. at Yiping. Flowing farther NE., it is increased by the R.s P'ei, Chi, and Chialing near Chungking. Having a tortuous course, bending in an ENE. direction, it waters the provs. of Szechwan, Hupeh, Kiangsi, Hunan, Anhwei, Kiangsu, and finally empties itself into the Yellow Sea. Its chief tribs. not already mentioned are the Han from the N., and the Wu from the S. The total length is some 3500 m., of which 1500 are navigable by steamboats. The area drained by the Yangtse is estimated at over 689,100 sq. m. The chief tns on its banks are: Chungking,

Hankow, Wu-chang, Nanking, and Chen-kiang.

In July 1949 there occurred on the Y. the daring exploit of the Brit. sloop *Amethyst*. The sloop was attacked in April by Chinese Communist artillery on the Y. while sailing to Nanking on a humanitarian mission on behalf of the foreign community, and suffered heavy damage and casualties. Her commanding officer was killed. The Communist military authorities refused to give the sloop a safe conduct unless Lieutenant-Commander Kerans signed a document admitting Brit. responsibility for the incident. This was unacceptable, and the sloop was then detained for 3 months under almost intolerable conditions. At the end of July the *Amethyst* slipped her moorings in defiance of her gaolers, and, successfully overcoming more than 140 m. of navigational hazards on a pitch-dark night without a pilot, reached the open sea without sustaining casualties in spite of opposition from shore batteries.

Yanina, *see* JANINA.

Yankee, or **Yank**, term often loosely used in modern Europe for anyone b. in the U.S.A. During the War of Independence it was derisively applied by Brit. soldiers to the New Englanders. During the Civil war it was applied by the Confederates to the Union troops, and is still used in the S. as a synonym for 'northerner.' Its origin is uncertain. It has been suggested that it derives from the Old Dutch *Janke* or was a corruption of *English* adopted by the New England Indians.

Yaounde, cap. of the Fr. Cameroons. It is connected by rail to Douala, 191 m. Pop. (1955) 36,000.

Yap, *see* CAROLINE ISLANDS.

Yard, length, *see* METROLOGY.

Yardley, dist. on the E. side of the city of Birmingham (q.v.), England, formerly a vil. The church was built before Columbus discovered America, and the vil. still preserves its medieval atmosphere.

Yare, riv. of Norfolk, England, rising near E. Dereham and flowing E. through the co. to the N. Sea at Yarmouth. It is joined by the Waveney 4 m. SW. of Yarmouth.

Yarkand (now called **Shu-fu**, and **So-chu**), walled city of Sinkiang, China, on the R. Yarkand, about 100 m. SE. of Kashgar. It has many mosques, caravanserais, and bazars. Leather goods, silk, carpets, and felt are among its manufs., and trade is chiefly with Russia. Pop. 118,600.

Yarmouth: 1. (correctly **Great Yarmouth**) Co. bor., seaside resort, and port of Norfolk, England, 20 m. E. of Norwich and 122 m. from London. Y. has a good harbour at the mouth of the Yare, with shipbuilding yards. The fisheries are a prominent industry, the chief fish caught being herring, mackerel, cod, and white fish. Notable buildings include a modern tn hall; the remains of the cloisters of a monastery and the walls; while other old features are the fishermen's almshouses and the Blackfriars Tower. On the S.

Denes is the Nelson monument, a column 144 ft high. It was on the jetty in the centre of the Marine Parade that Nelson landed after the battle of the Nile. Characteristic of the old town are the 'rows', a number of narrow lanes often only a few ft wide, some of which were destroyed during the Second World War. Fishermen from the Cinque Ports (q.v.) made a permanent settlement there. The famous Tollhouse in Middlegate Street, which was used as a library museum, was destroyed by Ger. aircraft in 1943. The par. church of St Nicholas, founded in 1101 and the largest in England, was gutted by fire in an air-raid in 1942. There are 2 piers, and a racecourse. Gorleston-on-Sea, part of the bor., is situated on the other side of the R. Yare, and it is at Gorleston that the riv., which runs through the port of Yarmouth, flows into the sea. There are Rom. remains at Burgh Castle. The High Stewardship is an anc't office of the bor. of Y. In former times the High Steward presided as judge in the bor. court and performed the duties which now devolve upon the Recorder. Y. was bombarded by Ger. warships in the First World War. The tn suffered heavy damage from air-raids during the Second World War, but since then reconstruction has taken place in the bomb-damaged areas in the tn centre, housing schemes have been initiated, and a modern power station is under construction on the S. Denes near the harbour's mouth. Pop. 51,105 (1951).

2. Small seaport on the NW. coast of the Is. of Wight, England, 10 m. W. of Newport, on the mouth of the Yare. There is good yachting. Pop. 1000.

3. Cap. of Y. co., Nova Scotia, Canada, on the Bay of Fundy. A railway junction, formerly an important shipbuilding centre, it is now a shipping point to Boston and other nearby New England cities for blueberries, lobsters, tuna, fresh fish, pulpwood, and lumber. Y. has a cotton factory and fish-processing plants. The Canadian National Railways' car ferry *Bluenose* carries 150 cars and trucks, 500 passengers, and freight to Bar Harbour in Maine. Pop. 8110.

Yarn, spun fibres ready for being woven into cloth. When the fibres are simply twisted together to form 1 thread the material is known as single Y. Cotton Y. is counted by the number of single hanks of 840 yds each in 1 lb. (avoidrupois); thus Y. running 30 such hanks to the lb. would be called 30 counts. Linen Y.s are of 2 kinds, line and tow. They are counted by the number of leas of 300 yds in 1 lb. Woollen Y. is soft, fluffy, and elastic. In the W. of England it is counted by the number of hanks of 320 yds in 1 lb., in some parts of Yorks by the number of yds in 1 oz.; each dist., however, has its own method of counting. Worsted Y., usually spun from virgin wool, is smooth and strong. It is counted by the number of hanks of 560 yds in 1 lb. Net silk may be Organzine or Tram; the former is more twisted than the latter, but both are very strong. Spun silk is made from the silk set aside

in the manuf. of fabrics from the cocoons. Silk Y.s are counted by the weight of 1000 yds in drams, or by the number of deniers in 1 hank, a denier being equal to 5/16 lb. Rayon and other synthetic fibres cut into standard lengths and spun into Y. are usually counted by the system used in the industry concerned. Y.s are folded, i.e. 2 or more single Y.s twisted together, for greater strength and for fancy effects. In the hope of simplifying the methods of designating Y. counts, the Textile Institute has for years attempted to secure the adoption of a single standard method. In this connection mention must be made of the method known as Grex proposed in America, and Tex proposed by the Textile Institute; these are respectively the weight in grams of 10,000 metres and the weight in grams of 1000 metres.

See *British Standards* 946 (1941), 'Designation of Twist in Single Yarns, Folded Yarns, and Cables,' and 947 (1941), 'Yarn Count Systems and Conversions'; *Textile Institute Year Book*, 1956.

Yaroslav I, the Wise, prince of Kiev, see KIEVAN RUSSIA.

Yaroslavl': 1. Oblast in Central Russia, N. of Moscow, adjacent to Rybinsk Reservoir (q.v.). It is a lowland region traversed by the Volga and partly covered with mixed forests. There are peat deposits. Area 14,250 sq. m.; pop. 1,371,000, Russian. It has engineering and textile industries, and there are varied old crafts; the area contains 2 large hydro-electric stations. Flax and potatoes are grown, and there is dairy farming (Y. breed). The prin. tns are Y., Rybinsk, Rostov.

2. Cap., economic and cultural centre of the above, the oldest Russian town on the Volga. It is an important industrial and transportation centre, with large engineering (automobiles), chemical (synthetic rubber), and textile (since 1722) industries, oil refining, and flour mills; it is a riv. port and has 4 railway lines. There are many outstanding architectural monuments of the 13th-17th cents., including 17th-cent. churches in the original Y. style. Pop. (1956) 374,000 (1917, 125,000; 1920, 76,000; 1926, 114,000; 1939, 298,000). Y. was founded in 1024, became cap. of Y. principality in 1216, Muscovite in 1463, and prov. cap. in 1777. It was a flourishing commercial centre on the Moscow-Archangel route in the 16th-17th cents. Its industrial development dates from 1564 (shipyards). Y. was Moscow's Volga port until the construction of the Moscow-Volga canal (1937). The first Russian prov. theatre was founded in Y. in 1750, and one of the first educational institutions of univ. level, Demidov Juridical Lyceum, in 1803 (transformed into Y. Univ. 1918, later abolished).

Yaroslavskiy, Yemel'yan (real name Gubel'man, Miney Izrallevich) (1878-1945), Russian politician of Jewish origin. He joined the Russian Social Democratic Labour party (q.v.) in 1898 and worked in the party's underground organisations as a firm follower of Lenin.

He spent sev. years in prison and banishment. Y. took an active part in the seizure of power (see OCTOBER REVOLUTION) in 1917. In 1918 he belonged to the Left Communists (see LEFT OPPOSITION), and later became a champion of Stalinism (q.v.), particularly in falsifying the party history. Y. was also the most prominent Militant Atheist (see ATHEISTS, MILITANT) and editor of the journal *The Godless*. See his *Religion in the U.S.S.R.*, 1932, *Landmarks in the Life of Stalin*, 1942, *Twenty-five years of Soviet Power*, 1943, and the official *History of the Communist Party of the Soviet Union (Bolsheviks): Short Course*, 1943, which Y. largely wrote.

Yarra Yarra, riv. of Australia, rising in the Great Dividing Range, and flowing thence 115 m. W. past Melbourne, Victoria, to the sea.

Yarrow, see MILFOLK.

Yarrow, riv. of Selkirkshire, Scotland, rising in the Moffat Hills and flowing ENE. through the Loch of the Lowes and St Mary's Loch to join Ettrick Water just SW. of Selkirk. It is noted for its literary and historic associations, and for the scenic beauty of the valley through which it runs, described by Wordsworth and Hogg. Length 24 m.

Yassy, see JASSY.

Yatton, par. of Somerset, England, 12 m. WSW. of Bristol. There is a fine church of the 14th and 15th cents., and the vicarage dates from the 15th cent. Pop. (estimated) 3000.

Yavorov (Ukrainian *Yavoriv*, Polish *Jaworów*), tn in the L'vov Oblast of Galicia (W. Ukraine), 30 m. W. of L'vov. The castle of Y. was the favourite residence of King John Sobieski of Poland. Pop. (1931) 11,000.

Yawl, see SHIPS AND SHIPBUILDING; SAILS AND RIGGING; YACHT.

Yawning, like sighing, is a deep inspiration, but Y. is accompanied by a stretching movement of the jaws and sometimes also of the limbs. Y. is not invariably a sign of boredom; sometimes it is merely the physiological reaction to high carbon dioxide content of the blood following a long period with the body immobilised or from being in a vitiated atmosphere for some time. Y. may also be induced by the sight of another person in the act or by continually watching a slow, rhythmic movement.

Yaws, or **Framboesia**, tropical disease characterised by the formation of red, raspberry-like tubercles upon the face, toes, and genital organs. It is a contagious disease, and chiefly affects young Negroes, though white men may suffer from it. It is endemic in the tropical parts of Africa, in Ceylon, E. and W. Indies, and many of the Pacific Is. In Ceylon it is known as *parangi*, in the Pacific Is. as *coco*, and in some parts of Africa as *dube*. It is caused by a spirochaete (*S. pertinax*) which is closely similar to, or identical with, the *S. pallida* of syphilis. Penicillin is highly effective against Y., as it is against syphilis. Since 1950 the World Health Organisation (q.v.) and the U.N. Inter-

national Children's Emergency Fund have assisted many countries in campaigns to rid themselves of the disease. In 1956 a long-term campaign was started, sponsored and supervised by W.H.O., to try and rid tropical Africa of Y. W.H.O. is providing technical experts and organising penicillin supplies to aid and augment local resources.

Yazd: 1. Dist. of Persia, bounded on the N. by the Central Desert (Dasht-e Kavir), on the S. by Sirjan and Bavanat, on the E. by the Desert of Lut and Rafsinjan, and on the W. by Nain, Bavanat, and Kuhpayeh.

2. Tn 165 m. ESE. of Isfahan. It is an ancient city, and was formerly a centre of the silk-weaving industry. It has small textile industries, match and soap factories. It contains sev. old mosques. It has a Zoroastrian community numbering c. 10,000. Pop. c. 66,500.

Yazoo City, cap. of Yazoo co., Mississippi, U.S.A. Pop. 9700.

Ybbs, Austrian tn in the prov. of Lower Austria, on the Danube, 40 m. E. of Linz. It is at the W. end of the Wachau (q.v.) and has an ancient church and castle. Pop. 4500.

Ybo, see NEGRO-AFRICAN LANGUAGES, *Sudanic*.

Yeadon, see AIREBOROUGH.

Year. Astronomers recognise various kinds of Y.s. The most usually employed is the *tropical* or *equinoctial* Y. This is the time required by the sun to complete a revolution with reference to the first point of Aries. The length of the tropical Y. is 365 days 5 hrs 48 min. 46 sec. Owing to the precession of the equinoxes (q.v.), the sun accomplishes the circuit from spring equinox to spring equinox in about 20 min. less time than it accomplishes the circuit of the heavens with reference to some fixed star, and hence the latter Y.—known as the *sidereal* Y.—is about 20 min. longer than the tropical Y. Its actual length is 365 days 6 hrs 9 min. 9 sec. The *anomalous* Y. is the time required by the sun to return from apogee to apogee or from perigee to perigee, or, expressed in another way, it is the time required by the earth to return from aphelion to aphelion or from perihelion to perihelion. Owing to the slow rotation of the line of apsides (q.v.), the positions of apogee and perigee move forward in the ecliptic by 11°25' a year, so that the sun takes longer to reach each of these points than it does to complete the circle of the heavens with reference to a fixed star. The length of the anomalous Y. is 365 days 6 hrs 13 min. 53 sec. The *eclipse* Y. is the interval between successive returns of the sun to the moon's node, and contains 346 days 14 hrs 52 min. 51 sec. See also CALENDAR; METROLOGY.

Year Books, ann. pubs., usually relating the events of the previous year, as the *Encyclopaedia Book of the Year*, and *Annual Register* (q.v.), or works of reference revised yearly, as *Whitaker's Almanack* (q.v.). *Willings' Press Guide* and *The Year Book of Education* are examples of Y.B. containing up-to-date information on particular subjects. See also ANNUALS.

Yeast is a soft, light-brown, cheese-like material. It consists of a mass of minute single-celled organisms belonging to the fungus group of the plant kingdom. The individual cells are just too small to be seen by the naked eye. Each cell reproduces itself by forming a bud on the surface of the cell which eventually separates as a new individual. The generic name is *Saccharomyces*, and the usual species in industry is *Saccharomyces cerevisiae*. Different strains of this are used in top and bottom fermentation, in distilling and in baking. Y.s are sometimes used medicinally and in the preparation of food extracts. They are rich sources of the B vitamins and of ergosterol—a source of Vitamin D. Most wild Y.s are found on the surface of fruits and flowers, but a distinct and different group lives on the skin and causes some types of skin disease. Under adverse conditions some Y.s can form ascospores. These are thick-walled cells, usually 4 in number, which form within the parent cell. Under favourable conditions they germinate and eventually give rise to the original vegetative form. Industrial Y.s can be divided into 3 main classes:

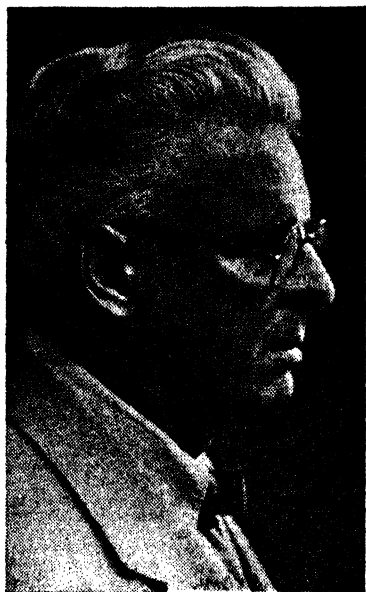
1. Baker's Y.s—which are characterised by their strong respiratory and reproductive powers.
2. Brewer's Y.s—which have stronger powers of fermentation and are slow and unsuitable for modern baking.
3. Wine Y.s.

Commercial Y. is prepared from a basis of molasses, to which are added Y. cultures, inorganic salts, and sterile air. The Y. culture is prepared by isolating a single cell of the particular strain of Y. required and allowing this cell to multiply in sterile conditions. Y. is a source of Vitamin B and enzymes—maltase, invertase, zymase. When given the correct conditions for multiplication—sugar, warmth, and moisture—the growth of the Y.s proceeds and a process of fermentation takes place. When Y. is added to a dough aeration takes place, owing to evolution of carbon dioxide in the following manner. Diastase in the flour converts starch into maltose, maltase converts maltose into glucose; the complex enzymic system formerly called zymase converts glucose into ethyl alcohol and carbon dioxide. In the warm conditions provided the carbon dioxide expands, increases the volume of the dough, and gives lightness and porosity. See BREAD; BREWING; WINE.

Yeats, Jack Butler (1871–1957), Irish painter, son of John Butler Y., a painter, and brother of W. B. Yeats; educ. privately at Sligo. His vigorous portrayals of Irish life and landscape are painted in a colourful and highly individualistic style. His pubs. include *Sailing, Sailing Swiftly*, 1933, and *The Careless Flower*, 1947.

Yeats, William Butler (1865–1939), poet and critic, b. Dublin. His family was Protestant, and his father was a painter. Y. was educ. at Godolphin School, Hammersmith, and Erasmus

Smith School, Dublin. He spent the middle years of his life in London and d. in the S. of France, but his most formative years were spent in co. Sligo. He was deeply influenced and inspired by the literary and mystic-religious heritage of his native land, but Eng. and Continental forms and ideas had much effect on his later work.



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W. B. YEATS

Y. studied painting, but soon realised that his strongest inclinations were literary. Only in later years, however, did his poetry afford him a comfortable livelihood. Of his earliest pubs. of verse, notable productions are *The Wanderings of Oisín*, 1889, *The Wind Among the Reeds*, 1899, and *In the Seven Woods*, 1903. He ed. the writings of Blake, 1893, and it seems that of all Eng. literary influences upon him, that of Blake was the strongest and the most enduring. He lectured in England and America, and was one of those responsible for the foundation of Dublin's Abbey Theatre, of which he became a director. There is a marked difference between Y.'s early work, full of splendid imagery and simple, spontaneous emotion, e.g. *The Wanderings of Oisín*, and the conscious art which asserts itself in such later work as *The Wild Swans of Coole*, 1917. Y. laboured in his later work to achieve technical perfection. In *The Winding Star*, 1929, he went back to reminiscence of his whole life as an artist: and in his posthumous

Last Poems, and Plays, 1940, poetic richness is combined with a sombre melancholy.

The greatness of his later work is now beginning to be realised, but his earlier poems still retain a generally wider popularity. 'The Lake Isle of Innisfree' and 'The Rose of the World' showed that Y. could versify the legends of his country with simplicity and fervour. He possessed the power to weave moving images out of the most commonplace suggestions from the things around him. This is notably illustrated in the 'Ballad of Father Gilligan' and 'A Dream of a Blessed Spirit'. Mention may be made of the *Countess Cathleen*, 1892, which is directly from the Fr. source and is one of the finest of the plays of Y. It is somewhat wanting in dramatic power, but contains some of the most finished poetry he produced.

Y. was awarded the Nobel prize for literature in 1923. Ireland acknowledged his greatness by making him a senator of the Irish Free State, and 9 years after his death, his body was brought from France and interred in Drumcliffe churchyard in co. Sligo. His lyrics place him among Ireland's greatest poets; but his genius transcended national boundaries, and critics of many nations agree that in splendour of diction and imagery and clarity of vision he was one of the most outstanding literary figures of his age. See lives and studies by J. H. Pollock, 1935; L. MacNeice, 1941; V. K. N. Menon, 1942; P. Ure, 1946; R. Ellmann, 1949; V. Koch, 1951; also T. R. Henn, *The Lonely Tower*, 1950; F. Wilson, *Yeats and Tradition*, 1951; a Yeats bibliography by A. Wade, 1953.

Yeavinger (O.E. *Adgerfrin*), vil. of Northumberland, England, 4 m. W.N.W. of Wooler. Excavations carried out between 1953 and 1957 have revealed the earliest royal residences found in England. Here a great hall, sev. smaller halls, and a large multi-tiered structure were erected in timber by the Anglo-Saxons soon after the beginning of the 7th cent. The township was burnt in 633 by the enemies of Edwin, whose cap. had been Y., but was twice rebuilt before being abandoned at the end of the same cent.

Yecia, Sp. tn in the prov. of Murcia, with manufs. of footwear, and a trade in cereals, wine, and fruit. Pop. 18,000.

Yedo, see TOKYO.

Yegor'yevsk, tn in the Moscow Oblast of Central Russia, 72 m. SE. of Moscow. It has a considerable textile industry (since 1820's). Pop. (1956) 59,000. Y. has been known since 1462 as a vil., and has been a tn since 1778.

Yekaterinburg, see SVERDLOVSK.

Yekaterinodar, see KRASNODAR.

Yekaterinoslav, see DNEPROPETROVSK.

Yelets, tn in the Lipetsk Oblast of Central Russia, 70 m. NW. of Voronezh. It is a local industrial and cultural centre and a railway junction; an old lace-knitting craft still survives. Pop. (1956) 60,000 (c. 1914, 58,000; 1926, 36,000). Y. has been known since 1146; before 1917 it had a flourishing grain trade (first elevator in Russia, 1888).

Yelgava, see JELGAVA.

Yellavetsgrad, see KIROVOGRAD.

Yelizavetpol', see KIROVABAD.

Yell, second largest is. of the Shetland (q.v.) group, Scotland, consists mainly of peat moorlands, but the coastal dists. and more fertile. Y. is noted for trout and sea fishing, and crofting is carried on. The main centres of pop. are at Mid Yell and Ulsta. Area 814 sq. m. (with the is. of Hascosay); pop. 1200.

Yellow, regarded, with red and blue (q.v.), as a 'primary' colour. Artists use as Y. pigments yellow ochre, cadmium and chrome yellow, lemon yellow (chrome, aureolin), and Naples yellow (see also COLOUR; PIGMENTS).

Yellow Atrophy, see LIVER.

Yellow Bird, name for 2 N. Amer. birds, *Chrysomitris tristis*, thistle bird, and *Dendroica aestiva*, yellow poll warbler.

'Yellow Book', The, an illustrated quarterly magazine pub. by Matthews and Lane in London in 1894-7. It was distinguished for its literary and artistic contributions by Aubrey Beardsley (who was for a time its art-editor) and Max Beer-bohm, both of whom gave free rein to their dynamic powers of caricature. Another leading contributor was Henry James.

Yellow Book of Lecan, now in Trinity College, Dublin, a collection of independent MSS., to one of which the name originally belonged; one of the most important is an early version of *Táin Bó Cúailnge*. The *Yellow Book* was published in facsimile by Robert Atkinson in 1896.

Yellow Cross, see MUSTARD GAS.

Yellow Emperor (Huang Ti) (c. 2700 BC), legendary Chinese emperor who is credited with having made a united kingdom out of all the warring groups under chieftains that were scattered over the whole country. The inventions and discoveries of many cents. have been assigned by tradition to the single reign of the Y. E.

Yellow Fever, Yellow Jack, or **Amaryl**, acute infectious virus disease occurring in tropical and subtropical regions except where rainfall is deficient; the region round the Gulf of Guinea and the Caribbean Sea, the noted areas, includes the W. Indies. Y. F. occurs also on the W. coast and the Brazilian coast of tropical S. America, and in Central America. In Africa it extends along the coastal regions from Senegal to the Congo. It has spread as an epidemic farther northwards into the U.S.A., and in 1940 there was an outbreak in the Sudan. Y. F. reappeared in epidemic form in Nigeria in 1946, for the first time for many years; but with the use of D.P.T. and intensive anti-amaryl inoculation, the disease was rapidly controlled. With the usual rise of temp., vomiting and rigor are found after an incubation period usually of from 1 to 4 days. This in slight cases is the whole course. In severe cases, jaundice and haemorrhage are prominent symptoms. Haemorrhage becomes very prominent, stools and vomit being both affected. Both skin and kidneys exhibit haemorrhage and it is also

common from the gums; the urine also contains excessive albumen. The usual treatment for fevers is employed. An effective prophylactic vaccine, using a strain of the virus transmitted through mice, is available. A more recent large-scale production of vaccine has been made possible by cultivating the virus in chick embryo. One attack usually gives immunity; the Negro is not very susceptible. Finlay, in 1881, suggested that the transmission of the disease was effected by mosquitoes. The Amer. Commission of 1900 traced the disease to a virus conveyed by the mosquito *Aedes aegypti*. Bauer has shown that other species of mosquito may also transmit Y. F. Gorgas carried out thorough tests of preventive measures in 1901. These were based on the prevention of breeding by the mosquito, by keeping all water vessels mosquito-proof, and covering puddles and stagnant water with oil; drainage and sanitation were thoroughly inspected and improved with the same purposes. Within 6 months the disease disappeared for the first time in Havana. The similar thorough measures carried out in the Panama Canal Zone completely confirmed the efficacy of the methods. Y. F. has been found to be enzootic in certain species of monkeys. This monkey virus is transmitted to human beings living in or near forests, and there is little doubt that it is the reservoir of infection (q.v.) and is capable of causing epidemics when introduced by some traveller into a community or town where *A. aegypti* is prevalent. Air transport has increased the risk of spread of Y. F. to countries in which it has not previously occurred. See also EPIDEMIOLOGY; TROPICAL MEDICINE.

Yellow Hammer, or Yellow Bunting, see BUNTING.

Yellow Hammer State, see ALABAMA.

Yellow Metal, see MUNTZ'S METAL.

Yellow River, Hoang-Ho, or Hwang-Ho, riv. of China, which rises in the Chishih-shan ranges in the prov. of Chinghai. After an extremely tortuous course it crosses the prov. of Kansu, flows into Mongolia, and then turns almost at right-angles S., separating Shensi from Shansi, passes through Honan, and flows into the Gulf of Chihli. The most important tns on its banks are Lanchow and Kaifeng, and its chief tribs. are the Wei Ho coming from the W., and the Fen Ho from the E. The riv. has come to be known as 'China's sorrow' on account of its tendency to burst its banks and to change its course, thereby causing great disasters, with the loss of millions of lives. In 1938 the Nationalist gov., in an attempt to stop the Jap. advance, breached the dyke on the S. bank. Some 2,000,000 ac. were flooded and 400,000 people perished. Intensive dyke-building since 1949 has kept the riv. under control, and hydro-electricity power stations are now built in the Liuchiyu and Sanmen Gorges. The Y. R. is the second longest in China, and has a length of 2600 m.

Yellow Rocket, see CRESS.

Yellow Sea (Hwang-Hai), large gulf of the Pacific Ocean, its length being about

620 m., and its greatest width 400 m. It is divided into the Gulfs of Korea, Liaotung, and Chihli, and to the E. is studded with is. Its waters are shallow, and are discoloured by the yellow mud carried down by the Yellow R.

Yellow-tail, see AMBER-FISH.

Yellow-wort, see BLACKSTONIA.

Yellowknife, tn in the NW. Terrs., Canada, situated in Y. Bay on the N. shore of Great Slave Lake. It is the centre of a gold-mining region. The tn was founded in 1935 after gold discoveries were made in the vicinity. Pop. about 3000.

Yellowstone, riv. of the U.S.A., trib. of the Missouri. Its source is in the Wyoming Rockies. It flows NNW. through Yellowstone National Park and Grand Canyon, then E. through Montana and N. Dakota to join the Missouri. Length 671 m.; it drains 70,400 sq. m.

Yellowstone National Park, U.S.A., U.S. Gov. Reservation in the NW. of Wyoming, projecting about 2 m. into Montana and Idaho. It is less a park than a series of parks formed by different valleys on the two sides of the Rockies, and is subject to great extremes of climate. The whole region is of geologically recent volcanic origin, and the geysers are still active. The scenery is famous for its brilliant colouring, and for natural phenomena, which include boiling springs and petrified forests, etc. There are sev. great herds of wild animals. The first white man to attempt an exploration of the region was a trapper named John Colter, who in 1807 traversed a part of this dist. His tales were disbelieved, but were confirmed 30 years later by the discoveries of James Bridger. In 1870 the first official survey was made, and in 1871 Ferdinand V. Hayden's expedition revealed the glories of the Yellowstone dist. Y. N. P. became a National Park in 1872. Area 3458 sq. m.

Yemen, The, state in the SW. corner of Arabia, bounded N. by Asir (q.v.) and Nejran, E. by the desert, S. by the Aden protectorate, and W. by the Red Sea; area 74,000 sq. m.; pop. perhaps 4,000,000. It consists of a coastal plain, and a double range of mts with a plateau between; the E. slopes are barren, except for occasional valleys, and fade into the desert. The coastal plain is hot and barren, though some oases lie at the foot of the hills; the W. face of the mts gets plenty of rain, is carefully terraced and fertile; the plateau is fertile with summer rains. About 70 varieties of grapes are grown. Before the Christian era Y. was the centre of sev. states which controlled one of the trade routes to the E. and also the incense route (see SABA). The opening up of the Persian Gulf-Palmyra route and of the direct sea route to and from India ruined their trade. The few monuments which are known, and the many inscriptions, show that these states had an advanced civilisation and elaborate organisations. In the Christian era the Abyssinians held Y. for a time, as did the Persians, but the Muslims soon conquered it, and it was first a part of the caliph's realm, then one

or more independent states or a dependency of Egypt and later of Turkey. In 897 Zeidi sectaries (a branch of the Shi'a) under an imam (q.v.) founded a state there which has lasted with vicissitudes till the present day. When the Turks left Y. in 1918 the Zeidi imam Yahya ibn Mohammad made himself master of the whole country. In 1934 Ibn Saud in a short campaign forced the imam to give up all claim to Asir and Nejran. The imam attempted to keep foreigners out of Y., and it was not till 1950 that there was any exchange of diplomatic representatives with non-Arab states. The sacred law of Islam is the law of the land, and there are no concessions to modernity. Slavery still exists. The Jews of the Y. who formerly made up the bulk of the country's artisans, were treated as second-class citizens, but nearly all the Jews (60,000) have now (1958) gone to Israel. In theory the imam Yahya was absolute (within the law), but prov. governors seem to have treated his orders much as they pleased. His family came to monopolise most of the country's trade, and this, combined with his conservatism, led to a rebellion in which the imam with 2 sons was murdered in Feb. 1948; the rebel leader Seyid Abdullah Ibn Al Wazir declared himself king, but the imam's eldest son Ahmad defeated and killed the usurper in Mar. and now rules in his father's stead. Y. joined Saudi Arabia and Iraq in a treaty of brotherhood in 1936, was represented at the London Conference on Palestine in 1939, and joined the Arab League in 1945. Though bound by treaty to Britain (1934 and 1951), Y. has not lost hope of possessing Aden, and during 1956 and 1957 there was increasing tension on the Y.-Aden frontier. There were aggressive incursions by Y. troops into Aden ter. and the Y. Gov. began to adopt a growingly hostile attitude towards Britain, and to strengthen her links with other Arab states. On 8 March 1958 Y. signed an agreement linking herself to the United Arab Republic (q.v.) in a federal union. This would have unified armed forces and a unified foreign policy, but would permit Y. to retain its monarchy, its international status, and separate diplomatic representation.

Trade is being developed; Y. exports coffee, food grains, hides, and raisins; a beginning has been made with irrigation and cotton growing. Oil was discovered in 1947, and coal is reported near San'a (q.v., 7260 ft.) one of the caps.; the other is Ta'izz (4600 ft.); other tns are Dhamar, Ibb, and Yerin, the ports being Mocha, Hodaida, and Loheiyah. As in the Hadramaut, the pop. is divided into sayyids, tribesmen, peasants, and half-castes. The Zeidis live mostly in the mts, while those of the lower ground are orthodox Muslims (Shai'is). The Ismailis, who once had a stronghold in Y., have disappeared. See also ARABIA. See C. Niebuhr, *Description of Arabia* (first pub. 1772), trans. 1889; F. M. Hunter, *Arab Tribes in the Vicinity of Aden*, 1886; O. Weber, *Edouard Glaser's Forschungsreisen in Südarabien*, 1909; H. F. Jacob,

Kings of Arabia, 1923; H. Scott, *In the High Yemen*, 1942; A. Farouqy, *Introducing Yemen*, 1947.

Yen (Jap. and Chinese *yuan*, round dollar), gold Jap. monetary unit, equal to 100 sen; also a silver coin of the same value, which was formerly current. In Oct. 1897 the gold standard was adopted with a unit value of 0.75 gramme of pure gold, called the Y., then equal to 2s. 6d., or 49½ U.S. cents, the pieces coined being 20-, 10-, and 5-Y. gold coins. Subsequently these gold pieces were used at double their face value and the 1-Y. silver was withdrawn. The notes of the Bank of Japan are of 3 denominations, 10, 100, and 1000 Y. The exchange rate at the end of 1957 was 1010 Y. to the £ sterling and 360 Y. to the American \$.

Yenakiyevo (from 1920's Rykovo, 1935-1943 Ordzhonikidze), tn in the Stalino Oblast (Ukraine), 28 m. N.E. of Stalino. It has large coal-mining, iron and steel (since 1897), and chemical industries. It was founded in 1853. Pop. (1956) 86,000 (1926, 24,000; 1939, 88,000).

Yendys, Sydney, see DOBELL.

Yenisey, riv. in Central Siberia, rising in the Sayan Mts (in 2 headstreams) and flowing N. into the Y. Bay (long estuary) of the Kara Sea. Length from the confluence of headstreams, 2100 m.; from the source of R. Selenga in the Y. drainage area, 3700 m.; drainage area over 1,000,000 sq. m. In the upper reaches the Y. is a mountain riv. with rocky shores and rapids; from below Krasnoyarsk to Dudinka it divides the W. Siberian lowland and the Central Siberian plateau and is a mighty stream with few is. and a wide valley. The main tribs. are the Angara (q.v.), Podkamennaya Tunguska, and Nizhnaya Tunguska. Y. is navigable almost throughout its course, and is chiefly used for transportation of timber, grain, and coal; it is accessible to seagoing vessels as far as Igarka (see IGARKA; NORTHERN SEA ROUTE). The chief ports are Dudinka, Igarka, Krasnoyarsk. The Y.'s great energy resources will be utilised with the construction of hydro-electric stations above Krasnoyarsk (3,200,000 kW., building began 1956) and at Yeniseysk (5,000,000 kW., projected). Y. was first visited by the Russians in the 16th cent., and its basin has been colonised by them since the 17th. It is an area of banishment (since the 17th cent.), labour camps, and great construction projects.

Yeniseysk, tn on the Yenisey in the Krasnoyarsk Krai (Central Siberia), 217 m. N. of Krasnoyarsk. Founded in 1618, it was a trading and administrative centre of the Yenisey basin in the 17th-18th cents. A gigantic hydro-electric station (5,000,000 kW.) is planned here. Pop. (1931) 6000 (c. 1914, 12,000).

Yental, see CHEROF.

Yeo: 1. Riv. of Somerset, rising in Dorset. It flows past Yeovil and joins the Parret after a course of 25 m.

2. Another riv. of Somerset. It rises near Harptree and flows by way of the Y. Reservoir into the Bristol Channel. Length 17 m. There is also a Y. in Devon.

Yeoman, originally a 40-shilling freeholder intermediate in status between the gentry and the peasantry; qualified to serve on juries and vote for knights of the shire, etc. Later, a small landowner or person of the middle class engaged in agriculture.

Yeomanry, name applied to mounted volunteer corps, not generally so called until 1794. Bodies of volunteer horse were raised before this during the reign of William III and at the time of the 1745 rising. The first 1745 unit was the Northampton Defence Association which raised in that year a strong troop of 200-300 gentlemen and their mounted servants. In that year also certain landowners of Yorks. formed the Royal Regiment of Hunters 'to harass the Rebels in their march.' The first unit of any permanence was the London and Westminster Light Horse Volunteers (1779). Following on the early successes of the Fr. revolutionary armies, a second wave of yeomanry corps came into being in 1794, but was not this time intended to fulfil a guerilla rôle but to replace cavalry regiments of the line drafted overseas. By May of that year 32 corps were in being; the first was the Rutland corps with 3 troops, followed by Kent and Surrey with 7 and 6 troops respectively. A troop had anything between 40 and 80 effectives. By 1798 every co. and sev. large tns had raised Y. to a total for the whole country of 163 troops, each nominally 150 strong, though probably there were only about 16,000 effectives in all.

Regulations for the raising and maintenance of such troops were in general the same as for Volunteers; the gov. provided only ammunition except on actual service, and the Y. were bound to act as mounted police in case of riot (see VOLUNTEERS).

After 1816 the Y. were reduced but not, like the infantry volunteers, disbanded, and for many years, until the estab. of co. police forces, played an important part in the maintenance of public order, being frequently called out to suppress riots and other disorders. Between 1899 and 1918 15 new Y. regiments were raised, of which 2, the Lovat Scouts and the Scottish Horse, served as regiments in S. Africa. The rest provided drafts for the Imperial Yeomanry.

In 1914 there were 53 regiments of Y. Some served dismounted on the W. Front, and 1 cavalry div. of the Egyptian Expeditionary Force (the 74th) was entirely made up of Y.

When the Territorial Force was constituted in 1908 the Y. with the volunteers was merged in it, and when it was revived in 1922 as the Territorial Army it included 55 Y. regiments. Six of these formed the 5th and 6th Cavalry Brigades, there were 8 Army Troops Cavalry Regiments, 8 groups of Armoured Car Companies, 8 Field Brigades R.A., and the remainder were converted to other arms, mostly artillery. In these capacities they served in the Second World War, and still retain their individuality. There were at the beginning of 1958 46 Y. regiments, 19 serving as R.A.C. T.A., 26 as R.A. T.A., and 1 as a Signal Regt. T.A.

Yeomen of the Guard, Brit. royal bodyguard, employed on state occasions as part of the sovereign's retinue, founded by Henry VII in 1485. The bodyguard consists of 6 officers (a Captain, a Lieutenant, an Ensign, a Clerk of the Cheque and Adjutant, and 2 Exons) and 80 men, all selected for long and distinguished service in the regular army, the Royal Marines, or the R.A.F. There has been very little change in the men's uniform since Tudor times, but the officers' uniform was changed by command of William IV from a Tudor style to that of their present uniform of a field officer of the Waterloo period. The term 'Beefeaters,' given to both the Yeomen Warders (q.v.) of the Tower of London and the Y. of the G., is of uncertain derivation, but it seems most likely that the name was applied in the late 17th cent. by a visiting Fr. count on account of the large daily ration of beef given to the Y. of the G. See Sir R. Hennell, *History of the Bodyguard of the Yeomen of the Guard*, 1904.



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A FORMER CHIEF YEOMAN WARDER,
WITH HIS STAFF OF OFFICE

Yeomen Warders, guardians of the Tower of London (q.v.), presumably in existence as a body since 1078, when Wm the Conqueror began the building of the

White Tower. They were not appointed members of the Yeomen of the Guard (Extraordinary) until 1552, when Edward VI also granted their existing state dress. They do not wear the cross belt of the Yeomen of the Guard. Their blue undress uniform was granted by Queen Victoria in 1858. Candidates for enrolment as Y. W. must be serving warrant officers or staff sergeants of the Army or R.A.F. under 50 years of age; the many other qualifications which are demanded are set out in Queen's Regulations. Y. W. are always on duty while the Tower is open to the public; at other times regiments of the Brigade of Guards normally mount the guard. *See also YEOMEN OF THE GUARD.*

Yeovil, municipal bor. and mrkt tn of Somerset, England, on the R. Yeo. The church of St John the Baptist is a 14th-cent. example of the Perpendicular style, and is known as 'The Lantern of the West.' Prin. industries are gloving, leather dressing, aircraft manuf., and food processing. Pop. 23,770.

Yerevan (formerly Russian Erivan'), cap., economic and cultural centre of Armenia. It has large aluminium, engineering, food, and light industries, and manufs. synthetic rubber, tyres, chemicals, and electrical equipment; its brandy is famous. It is the seat of the Armenian Academy of Sciences (1943) and a univ. (1920). Known since the 7th cent., from 1440 it belonged variously to Persia and Turkey; it became Russian in 1827 (prov. cap.), and was cap. of independent Armenia from 1918 to 1920. Pop. (1956) 385,000 (c. 1914, 33,000; 1926, 65,000; 1939, 200,000), mostly Armenians.

Yermak (d. 1584), Cossack ataman (*see* COSSACKS; HETMAN) commonly known as 'the conqueror of Siberia.' At the head of 840 Cossacks and soldiers Y., who was in the service of the merchant family of Stroganovs (q.v.), in 1581-4 invaded the Siberian Khanate (q.v.) and conquered its cap., upon which W. Siberia was annexed by Muscovy. *See also SIBERIA.*

Yevele, Henry (d. 1400), now regarded as the greatest Eng. medieval architect, was given charge of the royal works at Windsor Castle in 1360. Other buildings attributed to him are Westminster Hall; the nave, W. cloister, Abbot's House, and sev. monuments at Westminster Abbey; the nave of Canterbury Cathedral; the W. Gate and City Walls of Canterbury; Cowling Castle; and some bridges. *See biography by J. Harvey, 1944.*

Yevpatoriya (until 1783 Gözlev), tn in the Crimea, on the Black Sea shore, 50 m. NW. of Simferopol'. It is an important beach and mud health resort, particularly for children. An anct. Gk colony, it became Turkish in 1478, and Russian in 1783. It has been the spiritual centre of the Crimean Karaites since 1837. Pop. (1956) 55,000 (c. 1914, 32,000), before 1946 partly Tatar.

Yew, *Taxus baccata*, European evergreen tree, with linear leathery leaves and dioecious flowers, followed by bright, rose-red, cup-shaped fruits or arils. The

tree attains a very great age; its wood is hard and close grained, but splits readily. It was formerly used for making long-bows. Its leaves and seeds are poisonous.

Yezd, see YAZD.

Yezhov, Nikolay Ivanovich (? d. 1939), Russian Communist, one of the most sinister figures of the Stalinist regime (*see* STALINISM). He came from a poor family, received little education, and joined the Communist party (*see* COMMUNIST PARTY OF THE SOVIET UNION) after it had seized power in Russia. He emerged from obscurity in 1934, when he became a member of the party's Central Committee and of the Central Committee's Organisational Bureau; and soon afterwards became chairman of the Commission of Party Control (which was referred to as the party's 'intelligence service') and secretary of the Central Committee. In 1936 Y. was appointed Commissar for Internal Affairs (*see* N.K.V.D.) with the express task of carrying out the Great Purge (q.v.), probably the bloodiest period of the Communist regime, known in Russia as the 'Yezhovshchina.' He was dismissed in 1938 soon after becoming a member of the Politburo (q.v.), and succeeded by Beria (q.v.). Y. was appointed Commissar for Water Transport, but has not been heard of since 1939. In his secret report to the 20th Party Congress (1953) Khrushchev described Y. as a degenerate. *See B. D. Wolfe, Khrushchev and Stalin's Ghost, 1957.*

Yezhov-Cherkessk, see CHERKESSK.

Yezidis, or Shemsieh Kurds, religious sect who live chiefly in the Sinjar hills, N. of the Mesopotamian plain, but also found on the Van and Erzerum plateaux in Persia, and in Transcaucasia, near the E. bank of Lake Gokcha. Their beliefs come from Mohammedan, Christian, and various other sources. They are commonly called 'Devil Worshipers.' Their religion is based on the worship of good and evil.

Yezo, see HOKKAIDO.

Yggdrasil, Iggrasil, or Igrasil, Nordic 'the tree of Life,' the vast ash-tree which was the entire universe. Y. had 3 roots: one in Nifheim, in the well Hvergelmir, which the dragon Nithögr gnaws ceaselessly; one in Jotunheim, in the well Mimr, the source of all wisdom; the third in Urthabrunn, from the waters of which the Norns sprinkle Y. every day to avert its decay. The branches of Y. are inhabited by an eagle and a hawk; the foliage feeds 4 sacred harts; and Rata-töskr, the strife-making squirrel, goes continuously up and down the trunk to maintain the hostility of the eagle for Nithögr. *See MYTHOLOGY, Teutonic Mythology.*

YHWH, see JEHOVAH.

Yiddish (Ger. *Jüdisch*, 'Jewish'), the language of E. European Jewry and of its many emigrants in other parts of Europe and overseas (especially in the U.S.A., where there are some 5,000,000 Y. speakers), originated in the Rhineland in the 14th cent. Y. is based on Middle

High Ger. as it was spoken by Jews, who added to it sev. Romance words (Old It. and Old Fr.) and, particularly, many Heb. words and phrases peculiar to Jewish life and observance. Jewish migration transplanted it to various countries (Poland, Russia, Lithuania, Rumania, etc., also to England, the U.S.A., S. Africa), where Y. absorbed other Heb. words as well as words from Polish, Russian, Eng., etc. Y. employs the modern Heb. alphabet (with slight modifications), and is written from right to left; it has a rich literature: the best-known modern Y. writer was Sholem Asch (q.v.).

Yingkow, see NEWCHWANG.

Yinh sien, see NINGPO.

Yiping, or Hsüfu, tn of Szechwan, China, on the Yangtze, 130 m. SW. of Chungking. It is a trade centre, chiefly with Yunnan. Pop. 80,000.

Yird-house, see SOUTHERAINS.

Y.M.C.A., see YOUNG MEN'S CHRISTIAN ASSOCIATION.

Ymir, mythical Norse giant formed from the ice of the rivs., called Elivagar when this melts. Y. was nurtured by 4 streams of milk from the cow Audhumla, which created Buri, the grandfather of Odin. He fathered the Jötuns, a race of evil giants (q.v.), but Buri's wonderful grandchildren—Odin, Vili, and Ve—slew Y. and the race of giants, all save Bergelmir and his hideous wife, drowned in his blood. Y.'s body was flung into Ginnunga-gap abyss, and his slayers made from his blood the sea, from his bones the mts and rocks, from his skull the firmament, from his brain the clouds, from his flesh the earth, and from his eyebrows Midgard, where Man was eventually to dwell. Y. is known as the Rime Giant and typifies primeval chaos.

Ymuiden, see IJMUIDEN.

Yodel, primitive, wordless song, or warble, practised in various forms by mt-dwellers in Switzerland, Tirol, Styria, etc., characterised by rapid modulations from chest notes to falsetto, very free in rhythm and metre and using as a rule the restricted scale of the natural harmonies of instruments like the alphorn. The Y. is first mentioned in Acts of Martyrs, AD 397, but is doubtless prehistoric. Probable origin, the *Jauchzer* or whooping cry still used in greeting or warning.

Yoga, fourth of the 6 systems of Hindu philosophy, commonly regarded as a theistic development of the Sankhya, directly acknowledging Ishvara or a supreme being. Its alleged author is Patanjali, and its aim is to teach the means by which, through discipline of the body, the human soul may attain complete union with the Supreme Soul. See S. Dasgupta, *Yoga as Philosophy and Religion*, 1924; K. T. Behanan, *Yoga*, 1938; Sri Aurobindo, *Synthesis of Yoga*, 1948; P. Brunton, *Hidden Teaching Behind Yoga*, 1950; E. E. Wood, *Practical Yoga, Ancient and Modern*, 1951.

Yohimbine, alkaloid (q.v.) of the chemical formula $C_{17}H_{19}N_3O_2$. It occurs in the leaves and bark of the yohimbah tree (*Corynanthe Yohimbe*), and is used, par-

ticularly in veterinary practice, as an aphrodisiac.

Yokohama, chief seaport of Kanagawaken, Japan, on Tokyo Bay, with a good and commodious harbour. Y. in 1859 took the place of Kanagawa, which was first appointed as the treaty port on the W. side of Tokyo Bay, and now includes it. The tn grew rapidly and had considerable trade. With Tokyo, it was largely destroyed in a great earthquake, 1923, but was afterwards reconstructed. The chief imports are such raw materials as cottons, woollens, metals, sugar, and petroleum; the chief exports silk, cotton and chemical textiles, machines and tools, furniture, toys, paper, and tinned food. Y. was heavily raided by Amer. bombers in 1945, and suffered severe damage. It was quickly rebuilt, and is now one of the chief industrial cities of Japan. Apart from large shipbuilding yards, it has many factories producing foodstuffs, cloth and clothing, furniture, chemicals, glass, steel, railway carriages, firearms, electrical machines, and machine tools. Pop. 1,144,000.

Yokosuka, seaport and naval station of Kanagawaken, Japan, on Tokyo Bay, 14 m. SW. of Yokohama. Pop. 90,000.

Yola, tn of Adamawa prov., Nigeria, Africa, on the R. Benue near the border with the Cameroons. Y. is the cap. of Adamawa. Prin. crops are cotton, rice, and tobacco. Pop. c. 5300.

Yolo Archipelago, see SULU.

Yôm Kippur, or Yôm Ha-Kippurim, see DAY OF ATONEMENT.

Yonge, Charlotte Mary (1823-1901), novelist, b. Otterbourne, Hants. She pub. various historical works, a *History of Christian Names*, 1863, and a monograph on *Hannah More*; but she is chiefly remembered as the author of the sentimental novel *The Heir of Redcliffe*, which she pub. in 1853, and *The Daisy Chain*, 1856, both of which were extremely popular with young and old alike. She wrote over a hundred books in all. See lives by C. Coleridge, 1903; S. Bailey, 1934; G. Battiscombe, 1943. See also Margaret Mare and Alicia Percival, *Victorian Best-Seller*, 1948.

Yonkers, city of Westchester co., New York, U.S.A., on the Hudson R., N. of and adjoining New York city, of which it is a residential suburb. It has carpet, elevator, and cable manufacturing plants; Y. also makes hats, clothing, chemicals, knitted goods, and food products, and there are printing works. It is the seat of the Boyce Thompson Inst. for Plant Research and of St Joseph's Seminary and College. Tibbetts Brook Park and Empire Race Track are near by. Pop. 157,800.

Yonne: 1. Dept of central France, formed of parts of the anct. provs. of Champagne, Orléanais, and Burgundy. It is watered by the R. Y., and the surface is mostly flat. The dept is mainly agric., vines, cereals, beet, and mrkt-garden produce being cultivated, and livestock being raised. The prin. tns are Auxerre (the cap.), Avallon, and Sens (q.v.). Area 2,892 sq. m.; pop. 266,400.

2. Fr. riv. Rising in the Monts du Morvan, it flows NW. across the depts of Nièvre and Y. to join the Seine near Montreau. Length 183 m.

York, House of, branch of the Eng. royal dynasty of Plantagenet, descended from Lionel, Duke of Clarence, third son of Edward III, and Edmund, Duke of York, fifth son of Edward III. The head of the house was Richard, Duke of York, who was killed at the Battle of Wakefield, 1460. His sons, Edward IV and Richard III, and grandson, Edward V, were kings of England, 1461-85. Henry VII united the houses of York and Lancaster by marrying the daughter of Edward IV, Elizabeth. The title, Duke of York, has in recent times been borne by the second son of the reigning monarch.

York, Frederick Augustus, Duke of (1763-1827), soldier, second son of George III, b. London. He was given the bishopric of Osnabrück at the age of 6 months, so that he might receive its vast revenues. In 1784 he was created Duke of York and Albany. He commanded the Brit. forces in Flanders in 1793-5 and again on the occasion of the Helder expedition of 1799, both being campaigns in which Brit. arms met with little success. He was made a F.M. in 1795 and commander-in-chief in 1798. He lost this latter appointment in 1809 following scandals connected with his mistress Mary Anne Clarke, but was reinstated in 1811. He was responsible for a number of useful army reforms and founded the Duke of York's Royal Military School. He is commemorated by a column, with his statue on the top, near the Mall. He is also commemorated in the anonymous lines:

'The grand old Duke of York,
He had ten thousand men,
He marched them up to the top of the hill
And he marched them down again,' etc.

See J. Watkins, *A Biographical Memoir of Frederick, Duke of York*; A. H. Burne, *The Noble Duke of York*, 1949.

York: 1. City and municipal bor., cap. of Yorks, England, seat of an archbishopric, on the R. Ouse, 198 m. NNW. of London and 200 S. of Edinburgh. It is one of the most famous of Eng. cities, and contains many varied historical remains.

The Rom. fortress of *Eboracum* was estab. at the junction of the R.s Ouse and Foss in AD 71. During the 300 years of the Rom. occupation 3 emperors stayed here—Hadrian, Severus, and Constantius Chlorus. The 2 last named died in Y., Severus in 211 and Constantius in 306. The son of Constantius, Constantine the Great, was proclaimed here on the death of his father. The chief Rom. remains are the Multangular Tower and adjoining wall, c. 306, and the foundations of the earlier tower, c. 211, near to Monk Bar. Y. was successively a Saxon and a Dan. royal city, and was the cap. of the kingdom of Northumbria. In 627 King Edwin of Northumbria was baptised by Paulinus in a wooden church on the site of the present Minster. In the 8th cent.

Y. was renowned as a seat of learning; Alcuin, the headmaster of its school of St Peter, was called by Charlemagne to found a school at Aachen and a system of education for the Holy Rom. Empire. At the Conquest the pop. was estimated to be 8000, second in size only to that of London. Later it developed into an important commercial city, a centre of the wool trade, the small ships of its Merchant Adventurers sailing from the wharves of Y. to those of the Hanseatic tns. As the tonnage of ships increased the city's European trade declined and Y. lost its commercial importance, whilst retaining its eccles. and much of its political importance. It has at times been the virtual cap. of England; Parliaments have been held here, and Edward I, Edward II, and Edward III made it their base for the wars against the Scots. After the Pilgrimage of Grace Henry VIII estab. here the H.Q. of the Council of the North. The last Parliament held in Y. was called by Charles I. In 1644 the city was besieged by Parliamentary forces, and surrendered after Marston Moor. The 18th cent. saw a revival of its fortunes, when it became the fashionable resort for the northern gentry, and in the 19th cent. its prosperity was again estab. when George Hudson fulfilled his promise to 'make all't railways come to York.'

The chief glory of the city is the famous Y. Minster (q.v.). There are 17 other medieval churches in Y., but 2 of these are in decay, another has been put to secular use, and one, Holy Trinity, Goodramgate, is used for worship on Trinity Sunday only. This last has some interesting glass, a 'squint,' and box pews. All Saints', North Street, is famous for its 14th- and 15th-cent. glass and its graceful spire, whilst All Saints', Pavement, has a lantern tower distinguishing it from all the other churches. The last to be built before the Reformation, St Michael-le-Belfrey, 1535, has in its register an entry recording the baptism in 1570 of Guy Fawkes. The medieval Guildhall, built in 1448, was destroyed in 1942 by enemy action and is at present being restored to its former state. Three other Guildhalls remain, that of the Merchant Adventurers, the Merchant Taylors' Hall, and St Anthony's Hall. The last is now the depository for the diocesan archives. It is also the H.Q. of the Y. Academic Trust, which controls 2 centres for advanced research, in St Anthony's Hall the Borthwick Institute of Historical Research, and in St John's Church, Ousebridge, the Y. Institute of Architectural Study. The 13th-cent. walls, built upon earlier foundations, extend for 2½ m., and are pierced by 4 great Bars, or gateways. One of these, Walmgate, retains its barbican, whilst Bootham and Monk each has its portcullis. The fourth Bar, Micklegate, commands the road to London; on it were impaled the heads of those convicted of treason.

The grounds of the Yorks Philosophical Society contain, in addition to the Multangular Tower, the remains of St Mary's

Abbey, c. 1270. There is a museum of antiquities, a richly stocked Rom. museum, and a most valuable museum of mediæval sculpture. The nearby house, formerly that of the abbot of St Mary's, and later that of the Lord President of the Council of the N., is now known as the Yorkshire School for the Blind. It is entered from Exhibition Square, where is also the City Art Gallery. The Gallery has been recently enriched by the Lycett Green collection of old masters, which provides for the student a continuous series of examples of the development of European art. The Castle, or Kirk, Folk Museum occupies 2 buildings, formerly prisons, built in the 18th cent., which are overshadowed by Clifford's Tower, all that remains of Y. Castle. Of quatrefoil shape, it was built c. 1250, to replace the wooden tower built by the Conqueror. The Treasurer's House, once the residence of the Treasurer of the Minster, is now a period-furniture museum (National Trust). The railway museum, near the station, is the largest and best equipped of its kind in the country. There is a tangled network of narrow streets in the centre of Y., the most famous being Stonegate and The Shambles—the street of the butchers. The latter contains the house of Blessed Margaret Clitherow, the Y. martyr. It has been restored by Rom. Catholics of Y. as a shrine in her honour.

St Peter's School is one of the oldest public schools in England, and has claims to link it with the school of St Peter founded in 627. It was further endowed by Queen Mary in 1557. Archbishop Holgate's grammar school was founded in 1546, and there are 2 Friends schools, Bootham for boys (1823) and The Mount for girls (1831).

Y. is a great railway centre; its industries include carriage and wagon building, and the manu. of chocolate and confectionery, beet sugar, scientific instruments, glass, and plastic ware. It has been a military centre since Rom. times, and a parl. bor. since 1295. It has a lord mayor who shares only with London's mayor the title 'Right Honourable,' and has also a sheriff. Pop. 106,000. See M. Spence and M. E. Everatt, *A Short History of York*, 1949; C. B. Knight, *This is York*, 1951; J. Rodgers, *York*, 1951.

2. City and co. seat of Y. co., Pennsylvania, U.S.A., on the Codorus Creek 21 m. from Harrisburg. It originated as a Quaker settlement, and has an 18th-cent. Quaker meeting-house. It has numerous manu. and is the trade centre for a rich agric. region. Pop. 60,000.

3. Mun. tn of W. Australia, 77 m. E. of Perth. It is in a dist. which is the prin. source of the sandal-wood supply. Pop. 2820.

York and Lancaster Regiment. The Brit. regiment, formerly 65th and 84th Foot Regiments. The 65th was raised in 1756 as the 2nd Battalion, the 12th Foot (Suffolk Regiment), was made a separate corps in 1758, and went to the W. Indies, and from there to America for the War of Independence. Later it again went to the

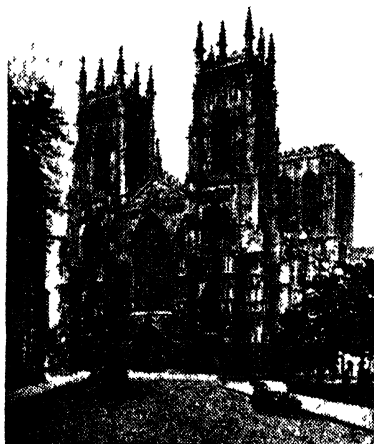
W. Indies and participated in the capture of Martinique and Guadeloupe, thence to the Cape and India, where it fought with distinction in sev. wars. The 84th was raised in 1793; its early service was at the Cape and in India and later in the Peninsula. It served with distinction during the Indian mutiny and at Tel-el-Kebir. The regiments were linked in 1881. During the First World War the Y. and L. raised 22 battalions and served in France, Flanders, Italy, Macedonia, Gallipoli, and Egypt. In the Second World War the regiment fought in France, Norway, Italy, and Germany. The 2nd Battalion took part in the defence of Crete and the garrisoning of Tobruk, and later formed 2 columns of Gen. Wingate's Chindits in Burma. See Col. H. C. Wyllie, *The York and Lancaster Regiment, 1758-1953* (3 vols.), 1930-56.

York Cycle. see MIRACLE PLAY.

York Minster. 'the cathedral and metro-political church of St Peter,' is one of the most famous of Europe's Gothic buildings. Two churches were built on the site in the 7th cent., and are mentioned by Bede. The first was a tiny wooden church dedicated to St Peter, and erected for the baptism of Edwin in 627. The second was of stone and was finished in 642. Bishop Albert built a new basilica on the site of one of these churches in the 8th cent. When Wm I besieged Y. the existing church was severely damaged and Y.'s splendid library was completely destroyed.

Some of the Saxon walls remain in the present crypt. In 1070 the first Norman Archbishop of York, Thomas of Bayeux, restored the Minster, and built the Norman nave and transepts, probably using part of Bishop Albert's church as the choir. The choir and crypt were rebuilt in the 12th cent. by Archbishop Roger. The present transepts were erected between 1220 and 1260, and the Norman nave was taken down and a new one built in the first half of the 14th cent., when the chapter house was built. The fine W. window was glazed in 1338. John Thoresby undertook the building of a new choir in 1361, for the enormous transept and nave, the largest in the country, had dwarfed Roger's structure. In the same year he laid the foundation of a great extension of the Minster to the E. A Lady Chapel was added. These changes made the Early Eng. tower of de Gray unsuitable, and in 1400-23 a central tower was built in its place. The N. and SW. towers were added between 1433 and 1471. This completed the Minster, and in 1472, after many reconstructions and enlargements, its appearance was almost the same as at the present day, although fires in the 19th cent. necessitated considerable repairs. Outstanding features of Y. Minster include its W. front, its nave, its crypt, its stained-glass, and a number of individual monuments. Many critics consider the Gothic W. front to be the best cathedral façade in England. The nave is remarkable for its size and graceful piers. The crypt was mainly discovered after the fire of 1829. It contains part of Archbishop Roger's cathedral and some 'herring-

bone' work. Among Eng. churches Y. Minster is pre-eminent in the amount, range, and quality of its surviving medieval glass of all periods from c. 1150 to c. 1510. A panel of 1160 glass occupies the foot of the middle light of the Five Sisters window in the N. transept. It represents the story of Habakkuk lowered into the lions' den by an angel to succour Daniel. Another 12th cent. panel, now in the nave, formed part of a Jesse tree.



Valentine & Sons Ltd., Dundee

YORK MINSTER: THE WEST FRONT

A fine example of English Gothic.

The Five Sisters window was partly restored between 1923 and 1925 as the Empire's memorial to the sacrifices made by women and girls in the First World War. On the S. wall of the N. transept is a fine rose-window, in the gable, inserted to mark the 'union of the roses' of York and Lancaster by the marriage of Henry VII and Elizabeth of York. But the chief glory of the whole collection of medieval glass at York, even including that in sev. par. churches, is the great E. window (1408). It is the work of John Thornton of Coventry. The window is 80 ft by 30 ft, and each of its 117 panels measures almost 3 ft square and the various panels represent scenes from the O.T. and the Apocalypse. Many of the tombs in the Minster suffered wholesale defacement during the Reformation, and the numerous medieval brasses were reduced to one. Interesting monuments include the tomb of Richard Scrope, archbishop from 1398 to 1405, who was executed outside the city walls, and the tomb of Archbishop Walter de Gray (1215-55). There are sev. curious gargoyles, and the choir-screen (c. 1475-1500) is a fine piece of Perpendicular work. On

1 Nov. 1955 the Duke of Edinburgh unveiled an astronomical clock in the Minster to be a memorial to nearly 20,000 R.A.F. officers and men who were killed or reported missing while operating from bases in N.E. England. The Minster library contains a most varied and anct collection of written and printed records. The Archbishop's house is at Bishopthorpe. The Archbishop's palace, to the N. of the Minster, was demolished at the end of the 16th cent. See F. Harrison, *Guide to York Minster* (on sale in the Minster), 1926-50; G. Home, *York Minster*, 1936, 1947.

Yorke, Philip, see HARDWICKE, PHILIP. Yorkshire, N.E. maritime co. of England; bounded on the N. by Durham, S. by the shires of Lincoln, Nottingham, and Derby, E. by the N. Sea, and W. by Lancs and Westmorland.

Y. formed part of the Brigantian kingdom of Deira with the Parisii in Holderness. It was conquered by the Romans in the 1st cent. AD, and by the Danes in 875, and came under the rule of Harold of England in 1066 after the Battle of Stamford Bridge. It was devastated by the Normans. Since then the co. has been the scene of many battles. In the wars of the Roses the Duke of York was slain at Wakefield in 1460, and the following year the Yorkists defeated the House of Lancaster on Towton Field. During the Civil war the co. was divided, and the prin. battle was fought at Marston Moor, where the Royalists were defeated. More than 260 anct monuments, prehistoric, Rom., and medieval, are protected. The co. has been noted for its archaeological interest for sev. cents., and there is a wealth of archaeological literature. Among many castles, the best known are Richmond, Bolton, Skipton, Knaresborough, and Scarborough. Middleham Castle was a residence of Warwick 'The King Maker'; and Richard II was murdered at Pontefract Castle in 1399. Of the eccles. remains the most important are the Cistercian abbeys of Fountains, Rievaulx, Jervaulx, Kirkstall, and Roche; the Augustinian priories of Bolton and Kirkham; and the Premonstratensian House at Easby. At York is the Benedictine abbey of St Mary. There were Benedictines at Whitby. Of York, Beverley, and Ripon Minsters, York is the finest.

Y. is the largest co. in England, and is divided into 3 Ridings, N., E., and W., each forming a separate administrative co. The coastline is fairly even, with cliffs of an average height; the largest indentation is that formed by the mouth of the Humber, which separates Y. from Lincs, others being Bridlington, Filey, and Robin Hood Bays, and the mouth of the Tees, which separates Y. from Durham. At Boulby the cliffs reach a great height (666 ft), and again at Flamborough Head; from this point to Spurn Head, a narrow, flat isthmus at the mouth of the Humber, the coast is low. The surface of the co. is varied; in the W. it is crossed by the Pennine Range, which reaches a height of 2591 ft at Mickie Fell in the extreme N., cut by beautiful dales, the prin. being Teesdale, Wensleydale, and Wharfedale;

while the centre is a vast plain, the plain of York, including the vale of Mowbray. In the NE. are the Cleveland and Hambleton Hills with small valleys, such as Bilsdale and Farndale, running down to the vale of Pickering, which separates them from the Wolds in the E. Riding. The prin. rivs. are the Ouse (which with the Trent forms the estuary of the Humber, and is itself formed by the junction of the Swale and the Ure) and its tribs., the Wharfe, Aire, Nidd, and Don, with the Derwent on the E. In the N. are the Esk and the Tees flowing into the N. Sea, and in the W. the Ribbles.

Of the attractive holiday resorts on the coast, the best-known are Scarborough, Whitby, Bridlington, Filey, Saltburn, and Redcar. Harrogate is an important inland spa specialising in rheumatic treatments. The E. Riding is the great corn-growing dist., with Driffield as the agric. centre. Oats and barley are the chief crops; and sheep are an important part of the husbandry. Sheep-farming extends over the fells of the N. and W. Ridings, and dairy-farming in the valleys; whilst large poultry-farms are estab. near Keighley. Forced rhubarb is grown widely around Leeds, and liquorice is made at Pontefract. Cleveland Bays and race-horses are bred in the N. Riding. Y. possesses valuable coalfields in the southern half of the W. Riding. In the N. Riding industry is centred at Middlesbrough; and Tees-side is the greatest steel-producing centre in Great Britain. The great woollen manufacturing centres are in the W. Riding at Leeds, Bradford, Halifax, Huddersfield, the Colne valley, etc., where woollens, worsted, flannels, fancy tweeds, etc., are made. Wholesale clothing and leather manufs. are among over 100 industries in Leeds. Sheffield has developed, from small forges situated in the surrounding countryside, into the centre of a vast iron and steel trade specially noted for plate and cutlery. Important fisheries exist at Hull (which has the largest fleets of up-to-date fishing craft in the world), at Scarborough, and at Whitby. Trawlers are built at Selby and cobles at Whitby; and Selby and Hull have large seed-crushing and flour-milling concerns. Communications are excellent: besides arterial roads and railways there is a system of canals which connects with the sea. The prin. ports are Hull, Goole, and Middlesbrough. The co. returns in all 56 members to Parliament. York is the co. tn.

In pop. Y. represents about one-tenth of the total pop. of England and Wales. The area is 3,888,237 ac. (E. Riding, 750,115 ac.; N. Riding, 1,362,058 ac.; W. Riding, 1,776,064 ac.); and the pop. (1951), E. Riding, 510,900; N. Riding, 525,500; W. Riding, 3,586,300; estimated total, 4,622,700.

See *Victoria County History, Yorkshire*; T. M. Fallow (ed.), *Memorials of Old Yorkshire*, 1909; P. F. Kendall and H. E. Wroot, *The Geology of Yorkshire*, 1924; F. Elgee, *The Archaeology of Yorkshire*, 1932; F. R. Pearson, *Roman Yorkshire*, 1936; A. J. Brown, *Striding Through*

Yorkshire, 1938; Ella Pontefract and Marie Hartley, *Yorkshire Tour*, 1939; Lettice Cooper, *Yorkshire: West Riding*, 1951; A. J. Brown, *Fair North Riding*, 1952; A. G. Dickens, *The East Riding of Yorkshire, with Hull and York*, 1955.

Yorkshire Coach Horse, see HORSE.

Yorkshire Light Infantry, see KING'S OWN YORKSHIRE LIGHT INFANTRY.

'Yorkshire Post', the chief Conservative paper in the Eng. provinces, beginning as the *Leeds Intelligencer*, a weekly started by Griffith Wright in 1754. The paper remained in its founder's family nearly 65 years, but from 1818 it passed through the hands of various proprietors. It was appearing 3 times a week in 1866, when it was bought by a group of Conservatives. It was then made a daily and re-named the *Yorkshire Post* and *Leeds Intelligencer*. During Neville Chamberlain's (q.v.) Prime Ministership it strongly opposed his appeasement policy. In 1939 the *Leeds Mercury* (q.v.), founded in 1718, was merged with the *Yorkshire Post*. In 1890 the company started the *Yorkshire Evening Post*, now the leading evening paper in Yorks and printed simultaneously in Leeds and Doncaster.

Yorkshire Regiment, see GREEN HOWARDS.

Yorkshire Regiment, East, see EAST YORKSHIRE REGIMENT.

Yorkshire Regiment, West, see WEST YORKSHIRE REGIMENT.

Yorkshire Terrier, small, long-coated dog, classified by the Kennel Club as a toy, with straight, silky hair reaching to the ground from the back of the head to the tail and parted in the middle of the back. It is blue-grey, with tan on the head, ears, and legs. The ears are small, V-shaped, and carried semi-erect; the body is compact and level on top of the back. The weight is about 5 lb. It is a very intelligent dog, probably the result of cross-breeding between the wire-haired black-and-tan terrier (a 'toy' dog) and the Skye terrier. It needs daily grooming, the coat being brushed straight down each side.

Yorkton, city of Saskatchewan, Canada, 140 m. NE. of Regina. A distributing centre in a rich agric. area, Y. has packing houses, flour mills, and an oil refinery. Pop. 7080.

Yorktown, vil. and co. seat of York co., Virginia, U.S.A., on the York R. Here the last important battle of the Revolutionary War was fought in 1781, when Lord Cornwallis surrendered to Washington. Pop. 384.

Yoruba, fertile and densely populated region of W. equatorial Africa, included in the Federation of Nigeria (Br.). The Y. are one of the 4 main linguistic groups of Nigeria, and according to the last census the group numbered (1952) 4,508,000. The Y. region, with an area of about 18,500 sq. m., lies SW. of the Lower Niger (Quorra), adjoining Dahomey on the W. and Nupe on the NE., and reaching from Borgu nearly to the Bight of Benin. Y. is spoken with some uniformity to-day throughout the ancient kingdoms of the SW. of Nigeria and, with

the spread of literacy, is developing a literature of its own. Tribal tradition holds that the Y.s originated in the Ife, where God first created man, and, although the extent of the ter. under the direct control of the Oni of Ife was much curtailed in the 19th-cent. Y. civil wars, Ife is still recognised as the spiritual H.Q. of the race, and the Oni enjoys a position of influence as the custodian of the tribal relics, which are a number of bronze heads of unknown origin (see IFE). The true origin of the Y.s is unknown to anthropologists. Up to the beginning of the 19th cent. the Y. kingdom occupied a large area, but this then crumbled before the Fulani (Mohammedan) invaders, who estab. a Fulani emirate in what had been one of the most prosperous of the Y. provs. Central Y. authority collapsed and the Y. clans entered on a period of civil war which lasted intermittently for 70 years. In the development of native administration in Nigeria following the amalgamation of N. and S. Nigeria the Brit. Gov. found that the Y. area contained strong chieftainships to which the system of native administration already introduced into the emirates of N. Nigeria was readily applicable.

Agriculture, cattle-rearing, and cocoa growing are carried on and there are many handicrafts in the tns, notably textile weaving. The chief tns are: Ibadan, Oyo (the cap.), Abeokuta, and Ogbo-mosho. Organisation is increasing with the growing social amenities. See P. P. Talbot, *The Peoples of Southern Nigeria*, 1926; Lord Hailey, *An African Survey* (revised 1956), 1957.

Yosemite Park, E. central California, U.S.A., national park embracing the Yosemite Valley, U.S.A., and covering an area of 1182 sq. m. The region is composed of granite, and the riv. valley is extremely beautiful, with all kinds of flowering plants and tall trees for the 7 m. of its length. The Nevada, Yosemite, Ribbon, Silver Strand, and Bridalveil Falls are among the finest in the world. Discovered in 1851 by Bolling and his soldiers, it was made a national park by Act of Congress in 1866. It is still inhabited by a few Indians. The Yosemite Falls have a total descent of 2425 ft.

Yoshkar-Ola (formerly Tsarëvokok-shaysk, 1919-27 Krasnokokshaysk), tn in Russia, 80 m. NW. of Kazan', cap. and cultural centre of the Mari (q.v.) Autonomous Rep. It has varied industries. Y. was founded in 1578 by the Russians as a fort. tn and administrative centre in the Mari country. Pop. (1956) 73,000 (1934, 15,000), mostly Russians.

Youghal (pronounced Yawl), urb. district, market tn, and seaside resort of co. Cork, Rep. of Ireland, on the W. side of the Blackwater estuary, 30 m. E. of Cork. St Mary's Church and College were founded in 1464, and at Y. are Raleigh's house, and ruins of Benedictine and Dominican abbeys. There are salmon-fisheries, and exports of corn and livestock. Y.'s main industry is now manuf. of rayon fabrics and cotton spinning, and bricks and earthenware are also made.

Moby Dick was filmed here in 1954. Pop. 5000.

Young, Arthur John (1885-), clergyman and poet, b. Elgin. Educ. at Edinburgh Univ., in 1920 he removed to Hove in Sussex, in 1941 became vicar of Stonegate, and in 1948 a canon of Chichester Cathedral. Writer of many nature poems, he pub. *Songs of Night*, 1910, *Isas and Ruth*, 1920, *The Bird Cage*, 1926, *The New Shepherd*, 1931, *Winter Harvest*, 1933, *The White Blackbird*, 1935, *The Green Man*, 1947, and *Into Hades*, 1952. In 1952 he was awarded the Queen's Medal for Poetry.

Young, Arthur (1741-1820), agriculturist, b. London, but brought up in Suffolk. Y. was a practical farmer and wrote many books on agric. and political subjects. His works include: *The Farmer's Letters to the People of England*, 1768, *Observations on the Present State of the Waste Lands of Great Britain*, 1773, *A Tour in Ireland*, 1780, and *Travels in France*, 1792. He was elected a fellow of the Royal Society in 1773, and appointed in 1793 secretary to the Board of Agriculture. Y. was a pioneer in his promotion of modern agric. methods, and his ideas were of European influence.

Young, Brigham (1801-77), Amer. Mormon leader, b. Whitingham, Vermont. He joined the sect in 1832, soon became important, and succeeded J. Smith as prophet and first president (1847). Under his leadership the Mormons, when driven from Nauvoo, finally settled in Utah, founding Salt Lake City (1847). Y. proclaimed the doctrine of polygamy (1852). Y.'s capability as an organiser and administrator enabled the Mormon state to survive its early difficulties and become a flourishing area.

Young, Edward (1683-1765), poet, b. Upham, Hants. Educ. at Winchester and Corpus Christi College, Oxford, he pub. 2 poems in 1713, *The Last Day* and *The Force of Religion*. His plays *Busiris*, 1719, and *The Revenge*, 1721, were followed by a collection of satires, *The Love of Fame, the Universal Passion*, 1725-8. In 1727 he took holy orders, and in 1730 became rector of Welwyn, Herts. Next year he married Lady Elizabeth Lee, and on her death wrote his most famous work, *The Complaint, or Night Thoughts*, 1742-4. A mournful meditation in blank verse, it was for long greatly celebrated; though sometimes artificial and forced, Y.'s poetry has passages of sublimity. See H. C. Shelley, *The Life and Letters of Edward Young*, 1914; H. Clark, *The Romanticism of Edward Young*, 1929.

Young, Emily Hilda (1880-1949), novelist, b. Northumberland. In 1902 she married J. A. H. Daniell, a solicitor, and they lived in Bristol, which provided the background of her novels. Writing effectively of ordinary everyday persons, she has been called 'the apostle of quiet people.' Her novel *Miss Mole* gained the Tait Black Memorial Prize for 1930; others are *A Corn of Wheat*, 1910, *Yonder*, 1912, *Moor Fires*, 1916, *William*, 1925, *The Vicar's Daughter*, 1928, *The Curate's Wife*, 1934, *Celia*, 1938, *Caravan Island*,

1940, *River Holiday*, 1942, and *Chatterton Square*, 1947.

Young, Francis Brett (1884-1954), novelist, b. Halesowen, Worcs. Educ. at Epsom College, he studied medicine at Birmingham Univ. and practised at Brixham from 1907 to 1914. In the First World War he served with the R.A.M.C. in E. Africa, and wrote about it later in *Marching on Tanga*, 1918. Many of his novels have his native Worcestershire as background. *Portrait of Clair*, 1927, was awarded the Tait Black Memorial Prize; others are *Pilgrims Rest*, 1922, *My Brother Jonathan*, 1928, *Black Roses*, 1929, *Mr and Mrs Pennington*, 1931, *The House under the Water*, 1932, *White Ladies*, 1935, *They Seek a Country*, 1937, *The City of Gold*, 1939, and *The Man About the House*, 1942. *Poems 1916-1918* appeared in 1919, and in 1944 *The Island*, a long poem about England. His last work was *In South Africa*, 1952, and he died in Cape Town.

Young, Owen D. (1874-), Amer. lawyer and financial expert, who was chairman of an Allied committee which in 1929 devised a scheme for Ger. reparations known as the Young Plan (q.v.).

Young, Thomas (1773-1829), physician, physicist, and Egyptologist, b. Milverton, Somerset. He was a remarkable youth, and before the age of 20 had acquired a knowledge of Latin, Greek, Hebrew, Chaldee, Arabic, Syriac, Persian, French, Italian, Spanish; later he learned German. He began medical studies, 1792, graduated at Göttingen, 1796, and was M.D. Cambridge, 1808. He practised in London from 1799 to 1814, the most highly educ. physician of his time. He was elected fellow of the Royal Society at the age of 21, and was its foreign secretary from 1802 until his death. From 1801 to 1803 he was prof. of natural philosophy at the Royal Institution. In 1811 he was appointed physician to St George's Hospital. Y. gave the first description of astigmatism (1801), was the author of the undulatory theory of light (1801-3), and of the theory that colour vision is due to retinal structures corresponding to red, green, and violet, a theory later modified by Helmholtz (q.v.). In 1804 he stated the theory of capillary attraction, and in 1808 the laws governing the flow of blood in the heart and arteries. An accomplished Egyptologist, and the earliest decipherer of hieroglyphics, he was the first to decipher part of the Rosetta Stone (q.v.). His *Introduction to Medical Literature*, 1813, a list of books which he considered necessary to a complete medical library, contains his classification of diseases. See lives by F. Oldham, 1933, and A. Wood, 1954.

Young, in New S. Wales, Australia, 258 m. WSW. of Sydney. It is the centre of a rural area, whose activities include sheep-grazing, orchards, and wheat-growing. Pop. 5570.

Young England, section of the Eng. Conservative party which about 1842 began a movement whose spirit and aim are well shown in Disraeli's *Coningsby*. Disraeli together with Lord John Man-

ners, later Duke of Rutland, was the chief leader of the movement, which aimed at better relations between different social classes, in order to prevent the capture of the working class by the Radicals.

Young Farmers' Clubs, National Federation of, rural youth movement that began with the formation of a few isolated Young Farmers' Clubs shortly after the First World War and in 1957 had a total membership of 67,458, with over 1570 clubs, together with co. federations in nearly all cos. of England and Wales. The aims of the movement are: (a) to provide a country youth service which will bring together the young people of the countryside; (b) to stimulate amongst young people a greater sense of the importance of country life, and of the interdependence of agriculture and industry; (c) to encourage amongst the future generation of country folk the continuance of education where schooling finishes. See FARM; FARMERS' CLUBS.

Young Guard, The (Russian Molodaya Gvardiya), underground organisation of young Russian patriots, members of the Komsomol (q.v.), which existed Sept.-Dec. 1942 under the Ger. occupation in the tn of Krasnodon, in Voroshilovgrad Oblast of the Ukraine. After performing heroic feats it was denounced by a traitor, and most of its members (it numbered about 100) were arrested, tortured, and murdered. It is described in A. Fadeyev's novel *The Young Guard* (see FADEYEV).

Young Ireland, Irish political party formed in 1846 by seceders from the Repeal Association of Daniel O'Connell (q.v.). Its aim was to unite the Catholics and Protestants of Ireland in an attempt to sever the union with England (see UNION, IRISH). Among its most prominent members were John Mitchel, Wm Smith O'Brien, Charles Gavan Duffy, Thomas Davis, and Thomas Meagher (qq.v.).

Young Men's Christian Association (Y.M.C.A.) seeks to help boys and young men to accept the Christian faith and live the Christian life, and to transcend the barriers of class, politics, race, and creed by a variety of religious, educational, physical, and social activities designed to develop Christian character. This movement was founded in England in June 1844 by (Sir) George Williams (1821-1905), then a clerk in a London drapery. The associations spread rapidly, especially after the Great Exhibition of 1851 and the estab. of the World's Alliance of Y.M.C.A.s in 1855. The movement in 1955 had a world membership of over 4,000,000 in nearly 10,000 associations in 78 countries. During both world wars the Brit. Y.M.C.A. worked among Brit. and Allied forces at home and overseas; the World's Alliance worked among prisoners of war and refugees, and continues to serve displaced persons in Europe and the Middle E. In 1957 the associations in England, Wales, N. Ireland, and Eire totalled 473, with a membership of over 73,000 boys and young men and nearly 6000 girls and young

women, in addition to a National Women's Auxiliary numbering nearly 5000. The Scottish associations, forming a separate national movement, had over 13,000 members in 66 centres. The largest national Y.M.C.A. movement is in the U.S.A., where there are 1715 centres and 3,150,000 members.

Young Offenders, see CRIMINAL LAW; JUVENILE OFFENDERS.

Young Plan, plan for payment of Ger. reparations after the First World War which superseded the Dawes Plan (q.v.). It was drawn up in 1929 by an international committee of experts, chief among whom was Owen D. Young of the U.S.A. It differed from the Dawes Plan in indicating a definite number of fixed annuities instead of payments depending on prosperity, and, instead of providing any measure of external control, it gave financial autonomy to Germany. The Plan proved unworkable and payments were suspended in 1931. *See REPARATIONS.*

'Young Pretender,' see STUART, CHARLES EDWARD LOUIS PHILIP CASIMIR.

Young Turk Party, see TURKEY.

Young Women's Christian Association (Y.W.C.A.) of Great Britain, voluntary association founded in 1855 to promote the social, physical, intellectual, and spiritual welfare of women and girls. International contacts and the formation of National Associations in other countries led to the institution of the World's Y.W.C.A. in 1894. To-day the World Y.W.C.A., which has consultative status on the U.N. Economic and Social Council, links together over 1,500,000 members, as well as 5,000,000 more who share in their activities in 65 countries. In Britain there are over 300 centres with a membership of 30,000. Clubs are open to any girl whatever her occupation, race, or religion. Hostels accommodate girls in professions, business, and industry, and students. Between 1939 and 1945 the Y.W.C.A. opened over 800 centres for service women in Britain and overseas. Through its International Service Committee, the Y.W.C.A. offers friendship to visitors from overseas, arranges for leaders of other National Associations to train in Great Britain, encourages the interest of members in world affairs, and supports, with personnel and finance, associations in the Commonwealth and overseas. Hostels, once established, aim to be self-supporting, clubs depend upon members' fees and local support, and for the balance the movement depends on public subscriptions and donations and on grants from public and private bodies.

Younger of Leckie, George, first Viscount (1851-1929), politician, eldest son of James Y., head of the brewery of the same name founded by another George Y. in 1722. He represented Ayr as a Conservative in the Commons from 1906 to 1922. He was invited by Bonar Law to assume the chairmanship of the Unionist Party, and was mainly responsible for the success in Dec. 1918 of the Coalition in the 'coupon election.' He was raised to the peerage in 1923.

Younghusband, Sir Francis Edward

(1863-1942), soldier and administrator, b. Murree, Punjab, and educ. at Clifton and Sandhurst. He joined the 1st Dragoon Guards in 1882. He transferred to the Indian Political Department in 1890. Y. won early fame as an explorer and traveller, and was later known as a writer on India and on Indian religion and philosophy, and for his work in connection with the organisation of conferences on world relations. He explored Manchuria in 1886, and travelled from Peking via Chinese Turkestan to India in 1887. He and Bell were the first Englishmen to reach India from China overland, crossing the Himalaya by the Mustagh Pass. Y. was political agent at Chitral, 1893-4, and was special correspondent of *The Times* on the Chitral expedition in 1895. Y. was Brit. Commissioner to Tibet, 1903-4, and Resident in Kashmir, 1906-1909. He was knighted in 1904. He was President of the Royal Geographical Society in 1919. His *South Africa Today*, 1898, was the outcome of his special mission to the Transvaal and Rhodesia, 1896-7, for *The Times*. His celebrated mission to Tibet in 1903-4 led to the unveiling of the forbidden city of Lhasa. His memoirs, *In India and Tibet*, were written in 1910. He was chairman of the Mt Everest Committee.

Young's Modulus, see ELASTICITY; MODULUS.

Youngstown, city in NE. Ohio, U.S.A., on Mahoning R. 55 m. from Pittsburgh. It is a pig-iron and steel centre. It manufs. metal products, rubber tyres, etc., and there are limestone quarries. The Butler Art Institute and Y. College are here. Pop. 168,300.

Youth Hostels. With the increasing popularity of hiking and cycling holidays, there has arisen a need for good overnight accommodation for the traveller of limited means, which the Y. H. organisations aim to satisfy. The International Y. H. Federation comprises nearly 30 associations, and under a reciprocal agreement encourages members to use hostels in any country within the Federation. The movement first assumed an organised form under the direction of Richard Schlirrmann in Germany, where the first hostel was opened in 1910. In the 1920's the idea spread to other continental countries, and since 1945 Y. H. have also been estab. in such E. countries as Palestine, India, and Japan. Y. H. are designed primarily for the use of young people, but in most countries there is no upper age limit. The buildings used vary from mansions to mt huts, but all provide simple accommodation, separate dormitories for men and women, cooking and washing facilities.

England and Wales. The Y. H. Association (founded 1930) consists of 19 semi-autonomous regional groups, each administering a number of hostels. In 1955 there were over 185,000 members, and nearly 300 hostels with over 14,000 beds. The National Office is at St Albans, Hertfordshire.

Scotland and Ireland. The Scottish Y. H. Association (founded 1931)

possessed 92 hostels in 1955, with 6942 beds (30,000 members); the Y. H. Association of N. Ireland (founded 1931) possessed 17 hostels in 1955, with 512 beds (4000 members); and the Irish Y. H. Association (An Oige) possessed 32 hostels in 1955, with 742 beds (4473 members).

Youth Organisations of Great Britain. The Standing Conference of National Voluntary Youth Organisations (with H.Q. at 26 Bedford Square, London, W.C.1) was founded in 1936 by a number of the leading youth organisations, representing a total membership of over 2,000,000 young people under the age of 21. These organisations are self-governing voluntary bodies, free to determine their own policy; they all work directly with young people in organised units under accredited leaders and, while they have great diversity of method, they have one common aim: the spiritual, mental, and physical training of young people. They are all non-political. They come together for joint consultation on the Standing Conference, which acts as a clearing house for the exchange of information, as a forum for examining diverse matters affecting the welfare of young people, and as a means of making joint representations or recommendations to statutory and other appropriate bodies. H.Q. is also a centre for overseas students and visitors. The Standing Conference works in close association with the National Council of Social Service, which provides the secretarial and office facilities.

Yperite, see MUSTARD GAS.

Ypres, John Denton Pinkstone French, 1st Earl of (1852-1925), soldier; *b.* Ripple, Kent. He was educ. at a preparatory school at Harrow and Eastman's Naval Academy, Portsmouth. He joined H.M.S. *Britannia* in 1866, and served in the R.N. for 4 years. He was commissioned in the 8th Hussars in 1874, soon transferring to the 19th; he took part in the Sudan campaign, 1884-5, and was present at Abu Klea, Gubat, and Metammah. He fought with distinction in S. Africa, and in 1900 was appointed to the command in the E. Transvaal, and took part in the operations against the rebels in Cape Colony until the end of the war. He commanded the 1st Army Corps at Aldershot, 1901-7, and was promoted *Heut.-gen.*, 1902. He was made F.M. in 1913, being appointed commander-in-chief of the B.E.F. at the beginning of the First World War. His failure, at Neuve Chapelle and Loos in 1915, to pierce the Ger. line was very costly, and he was recalled and given command of all the forces in the U.K. See also FRANCE AND FLANDERS, FIRST WORLD WAR, CAMPAIGNS IN. He was Lord-Lieutenant of Ireland from 1918 till 1921. He had been created viscount in 1916: he was made Earl of Ypres in 1921. See life by his son, G. French, 1931.

Ypres (Flem. *Ieper*), tn in the prov. of W. Flanders, Belgium, on the R. Yperlée. It was famous in the Middle Ages as a centre of the Flanders cloth trade. Its many fine

medieval buildings, the *mrkts*, including the famous Cloth Hall (1201-1342), St Martin's Church (13th cent.), the Gothic meat-mrkt, Renaissance tn hall, and Templars' houses, were destroyed during the First World War. Afterwards, many of the buildings were restored. The Menin Gate (1927) is a memorial to Brit. troops missing in the fighting around Y. in the First World War. Y.'s woollens were noted in the 14th cent., but the chief manufs. are now linen and biscuits. Pop. 17,200.

Ypres, Battles of (1st Battle, 19 Oct.-31 Oct. 1914; 2nd Battle, 22 April-25 May 1915; 3rd Battle, 31 July-10 Nov. 1917). Many of the most important actions of the First World War took place in the Ypres sector, which was held continuously by Brit. troops. Gun-fire and shells soon reduced the tn to ruins. The British occupied the place in the middle of Oct. 1914, and the *first* battle lasted for a month, the Germans making great efforts to recover the prestige they lost at the Marne. On 31 Oct. the Worcestershire Regiment defeated overwhelming numbers of Germans, who almost broke through at Gheluvelt, thereby saving the Channel ports from capture. The Germans estab. themselves, however, in sev. vils in the sector. The *second* battle commenced in the spring of 1915 by the Brit. capturing Hill 60 (q.v.) after it had been heavily mined. The Germans counter-attacked furiously, using poison-gas for the first time. Their much-advertised objective was Calais; they broke the Fr. line N. of Ypres, but were checked by the end of April. During May they launched heavier and heavier attacks with gas, and gained ground, recapturing Hill 60, gaining possession of Polygon Wood, and pushing back the British in the regions of the Roulers railway and Menin road. At the end of the battle the British were still holding Ypres, although the Germans had made some small gains at great cost to themselves. The *third* battle opened on 31 July 1917 with an attack by the British on a 15-m. front which was very successful. On 16 Aug. another attack on a 9-m. front N. of the Menin road resulted in the capture of Langemarck, and the French on the left also made progress. A few days later the advance was continued in a NE. direction with further success. On 20 Sept. another attack was launched up the Menin road. The Germans counter-attacked unsuccessfully. The last phase of this battle was the capture of the Passchendaele ridge by the Canadians in Nov.; heavy fighting followed which resulted in the British gaining more ground. See also FRANCE AND FLANDERS, FIRST WORLD WAR, CAMPAIGNS IN; WORLD WAR, FIRST; MENIN GATE; NEUVE CHAPELLE; PASSCHENDAELE.

Ypsilanti, or *Hypsilanti*, noble Gk Phanariot (Fanariot) family of the 18th and 19th cents. who claimed descent from the Comneni, and rose to great power in Constantinople. *Alexander P.* (c. 1792-1828) fought against the Turks in the Gk War of Independence, but after being

defeated at Dragashan (1821) fled to Austria. His brother *Demetrius* (1793-1832) also played a prominent part in the Gk struggle for independence.

Ypsilanti, city in Washtenaw co., SE. Michigan, U.S.A., 30 m. WSW. of Detroit and on Huron R. It is an industrial, commercial, and farm-trade centre, and manufs. paper, stoves, aircraft and auto parts, ladders, tents, awnings, clothing, chemicals, and foundry products. The huge Willow Run plant is near by. Y. is the seat of Michigan State Normal College. Pop. 18,302.

Ysaÿe, Eugène (1858-1931), Belgian violinist and composer, b. Liège, of Walloon stock. In 1886 he became prof. at the Brussels Conservatoire. He was known for his interpretations of the works of Bach, César Franck, and the great It. violinist-composers. In 1929 he produced an opera, *Peter the Coalminer*, in Walloon dialect, with libretto by himself.

Yser, riv. of France and Belgium, which rises 5 m. NNE. of St-Omer, and flows ENE. across the dept of Nord, turning gradually NW. across W. Flanders prov., to the N. Sea 2 m. NW. of Nieuport (qq.v.). Length 48 m. It was the scene of a battle, Oct.-Nov. 1914 (see WORLD WAR, FIRST).

Yssel, see IJSEL.

Ysselmonde, see IJSELMONDE.

Yssingeaux, Fr. tn, cap. of an arron., in the dept of Haute-Loire. It manufs. lace and ribbons. Pop. 6100.

Ystad, seaport of Malmöhus (q.v.) co., Sweden, on S. Baltic coast, with a good artificial harbour. It manufs. machinery, tobacco, matches, and chicory, and has shipbuilding yards. Pop. 12,000.

Ytterbium (symbol Yb, atomic number 70, atomic weight 173.5), rare-earth element. Marignac in 1878 obtained what he thought was pure Y. in certain minerals, e.g. gadolinite. Urbain and von Welsbach, 1907-8, split this up into lutecium and neo-ytterbium (i.e. what is now called Y.). Y. forms an oxide, Yb₂O₃, and sev. salts such as the sulphate, Yb₂(SO₄)₃.

Yttrium, symbol Y, atomic number 39, atomic weight 88.92, a rare metallic element allied to aluminium. It yields colourless salts, forms an oxide, Yt₂O₃, and belongs to the rare-earth group.

Yü the Great (c. 2197 BC), Chinese emperor, the last of the 3 famous 'ancient kings' of great virtue, the others being Yao and Shun. He constructed many valuable defences against flood. His reign, which is said to have begun in 2205 BC, marks the beginning of the first, or Hsia, dynasty. The tablet of Yü on mt Hengshan, a stone inscribed with an ancient script, is believed to date from his reign. See HUNAN.

Yuan, Mongol dynasty which ruled China from 1277 to 1367. It was founded by Kublai Khan (q.v.).

Yuan Chi, see CHINESE LITERATURE.

Yuan Shih-kai (1859-1916), Chinese politician, b. Hsiang-Cheng in Honan. In 1897 he was appointed judicial commissioner of Chih-li. When the revolution broke out in 1911 he became president

of the council of ministers, and was Premier for a short time. In 1913 he was elected President of the Chinese Rep., but proved himself a traitor by his self-styled coronation as emperor, fixed for Feb. 1916. But discontent began, the S. revolted, and Y. had to abdicate.

Yuanhing, see CHENCHOW.

Yucatán: 1. Peninsula of SE. Mexico, geographically including Brit. Honduras and the Guatemalan Petén; length 400 m.; mean breadth 200 m.; coast-line 700 m.; area 55,400 sq. m. The coast on the N. and W. is low and sandy, but higher and more indented on the E. The dist. contains many relics of the Maya (q.v.) civilisation, notably at Chichén Itzá and Uxmal. See W. von Hagen, *Maya Explorer*, 1947; Lilo Linke, *Magie Yucatán*, 1950.

2. State of the SE. part of Mexico, being one of the states forming the Y. Peninsula. It is bounded on the N. by the Gulf of Mexico, E. by the ter. of Quintana Roo, S. by the state of Campeche, and W. by Campeche and the Gulf of Mexico. The land is poor and rocky, with no rivs. but an abundant subterranean water supply. It is mostly flat, but towards the boundary with Campeche and in the S. it is somewhat hilly. The climate is tropical in the summer, but from Oct. to Mar. is equable. There is little malaria in Y. now, and the yellow fever has been exterminated. There is rail communication with Campeche, but communications in Y. are not generally good. The main products are sisal fibre, dyewood, and hardwoods. There are some small sugar mills in the S. Only one crop of corn a year can be obtained, owing to the scarcity of rain. Mérida (q.v.) is the cap., and has been extensively modernised. Area 14,870 sq. m.; pop. 517,000.

Yucca, or **Adam's Needle**, genus of slow-growing evergreen shrubs (family Liliaceae) bearing, when fully-grown, a huge erect panicle with pendulous flowers from the centre of a circle of thick linear leaves. See also JOSHUA TREE.

Yugoslavia (Serbo-Croatian *Jugoslavija*), federal rep. of SE. Europe, the largest country in the Balkan Peninsula (q.v.), bounded N. by Austria and Hungary, E. by Romania and Bulgaria, S. by Greece, SW. by Albania, W. by the Adriatic Sea, and NW. by Italy (qq.v.). Part of the Free Ter. of Trieste (q.v.), lying on the border with Italy, is under Yugoslav administration. By the peace treaty of 1947 Italy ceded to Y. most of the It. prov. of Venezia Giulia (Istria), including Fiume (Rijeka), the com. of Zara (Zadar), and some small is. (qq.v.). Area 99,066 sq. m.

Geography. Y. has a long coastline (450 m.) on the Adriatic, running parallel to the E. coast of the It. peninsula. In the NE. (the only low-lying part of the country) there are extensive plains, of which those in the extreme NE. are contiguous with the Alföld (q.v.) in Hungary. These plains are very fertile, and are watered by the Danube, Sava, Tisza, and Drava (qq.v.). In the N. there are spurs of the Alps (q.v.), including the Julian and Karawanken Alps, in the NW. there is the

Karst (q.v.), and running NW.-SE. above the littoral of Dalmatia (q.v.), are the Dinaric Alps (q.v.). The S. is a mass of mt ranges (including, in the SE., offshoots of the Balkan Mts, q.v.), with peaks of over 8000 ft. cut by deep riv. valleys, notably those of the Morava and the Vardar (q.v.). The mts are heavily forested. On the S. frontiers of the country there are sev. large lakes (e.g. Scutari and Ohrid, qq.v.). Lying close to the Adriatic coast there is a great number of is.; these are mostly narrow, elongated, and parallel to the shore of the mainland.

Constitution. Y. was proclaimed a rep. on 29 Nov. 1945. The Constitution declares that the Federal People's Rep. of Y. (*Federativna Narodna Republika Jugoslavija*) consists of the following People's Republics: Serbia (including the Autonomous Prov. of Vojvodina and the Autonomous Region of Kosovo-Metohija), Croatia, Slovenia, Bosnia-Herzegovina, Macedonia, and Montenegro (qq.v.). The federal cap. is at Belgrade (q.v.). On 13 Jan. 1953 the Constitution was amended by a New Fundamental Law, aimed at the decentralisation of the federal administration and intended also to increase the part played by the country's producers in the management of public affairs. All authority is said to derive from the people. The people realises its authority through its elected representatives in the People's Committees, the Assemblies of the People's Reps., the Federal Assembly, the Workers' Councils, and other bodies. Public representatives are elected by universal, equal, and direct suffrage by secret ballot. All citizens are equal, without regard to nationality, race, religion, or sex; no privileges of birth, property, or education are recognised. Church and State are separate. The highest organ of federal authority is the People's Assembly of the Federal People's Republic of Y. It consists of 2 Houses: the Federal Council and the Council of Producers. The Federal Council is comprised of one deputy for each 60,000 inhab., plus 10 representatives of the Council of each People's Rep., 6 representatives of the Council of the prov. of Vojvodina, and 4 representatives of the Council of the region of Kosovo-Metohija. The Council of Producers is comprised of deputies elected by workers engaged in production, transport, and commerce; one deputy sits for each 70,000 workers. The deputies elected by the Councils of the People's Reps., the Autonomous Prov., and the Autonomous Region, have a separate function as the Council of Nationalities when a motion is before the Federal Council concerning the Constitution or the Federal Economic Plan. The Federal People's Assembly serves for a term of 4 years, though this period may be extended in the event of war or national emergency.

The executive organs of the Federal People's Assembly are: (i) The President of the Rep., who is elected by secret ballot from among the members of the Assembly, and who is Chairman of the Federal Executive Council and Supreme Commander of the Armed Forces, and (ii) the

Federal Executive Council, which consists of 32 members elected from among the deputies of the Federal Council.

The most important political organisation in the country is the Socialist Alliance of the Working People of Y. (formerly the People's Front), which developed during the Second World War and was later joined by most of the pre-war political parties. The main constituent party of the Alliance is the Communist League, which had 624,806 members in 1955, and of which the Secretary-Gen. is Josip Broz Tito (q.v.); other parties are the Republican Party (composed mainly of intellectuals), the Democratic Party (formed originally in opposition to the 1929 régime), the Croat Republican Peasant Party (originally the party of the Radić brothers), and the Peasant Party (representing agric. interests in Serbia).

Local Administration and Justice. In the People's Reps., in the Autonomous Prov., and in the Autonomous Region there are People's Assemblies modelled on the Federal People's Assembly. Each People's Rep. independently enacts a Fundamental Law conforming with the principles of the New Fundamental Law of 1953. The People's Reps. are administratively divided into *oblasti*. There is a Supreme Court of the Federal People's Rep., and there are Supreme Courts in the People's Reps. and in the Autonomous Prov. Judicial functions in these courts are exercised by professional judges elected by the People's Assemblies. The lower courts are styled Co. Tribunals and Dist. Courts, and in them judicial functions are exercised by professional judges and lay assessors.

Population, Religion, Education, Chief Towns. The pop. (census of 1953) is 16,927,275. The pops. of the constituent People's Reps., Prov., and Region are as follows: Serbia, 6,983,544 (including Vojvodina, 1,713,905, and Kosovo-Metohija, 809,234); Croatia, 3,913,753; Slovenia, 1,462,961; Bosnia-Herzegovina, 2,843,486; Macedonia, 1,303,906; Montenegro, 419,625. In 1953 5,236,000 persons were employed in agriculture and forestry, 1,612,000 in industry, commerce, and transport, and 466,000 in governmental and administrative services. The chief national minorities are Albanian, Magyar, Turkish, and Bulgarian. All religions recognised by the State have equal rights. In 1953 the percentages of the pop. belonging to the different churches were: Serbian Orthodox, 41.4%; Rom. Catholic, 31.8%; Moslem, 12.3%; Protestant, 0.9%. 12.3% of the pop. professed itself to be without religion. The Serbian Orthodox (Pravoslav) Church is ruled by a Patriarch and a Holy Synod, composed of 4 bishops. It has 23 bishoprics in Y., and 2 abroad (see GREEK CHURCH). The Rom. Catholic Church has 3 provs.: Belgrade, with 2 suffragan sees; Zagreb, with 4 suffragan sees; and Sarajevo, with 2 suffragan sees. There are also one archbishopric (Bar) and 7 bishoprics which depend directly upon the Holy See. The Protestant Churches include 4 Lutheran churches, the Reformed

Church of Y., and small groups of Methodists, Baptists, and Adventists. The seat of the *Religijna Ujedinjenja* of the Moslem Religious Union is at Sarajevo. The Jewish community has a Grand Rabbi at Belgrade, and has religious municipalities in the chief cities of each rep. Since 1945 the State has at various times exerted pressure on different religious groups, in particular the Rom. Catholics.

Primary education is compulsory and free. In 1954-5 there were 14,044 elementary schools, and 2,106 secondary schools. There were 84 institutions of higher and specialised education, including the univs. at Belgrade, Zagreb, Ljubljana, and Skopje. The national minorities have elementary and secondary schools of their own. The prin. tns are Belgrade (the federal cap.), Subotica, Novi Sad, Priština, Zagreb, Ljubljana, Sarajevo, Skopje, and Titograd (q.v.).

Agriculture. In 1954, 9,982,000 hectares of land (39 per cent. of the total area of the country) were under cultivation. Private land holdings are limited to 10 hectares by a law of 1953, and anything above this limit is confiscated; compensation for confiscated land will be paid over a period of 20 years at the rate of 30,000-100,000 dinars a hectare. The chief crops are maize, wheat, barley, oats, rye, rice, potatoes, onions, peas, beans, and peppers. Apples, pears, plums, walnuts, chestnuts, and other fruits are grown in large quantities. Of industrial importance are sugar beet, tobacco, hemp, flax, cotton, hops, sunflowers, and chicory. Good brandies and wines are produced (2,851,834 hectolitres in 1954). The timber resources of the country, chiefly beech, oak, and fir, are valuable; some 30 per cent of the surface of the country is wooded. Y. is also known for its live-stock; in 1955 there were in the country 12,000,000 sheep, 5,300,000 cattle, 4,800,000 pigs, 1,240,000 horses, and 24,900,000 poultry.

Industry and Commerce. Y. has rich mineral resources, including coal, lignite, bauxite, lead, antimony, copper, mercury, chrome, gold, silver, salt, and magnesite. The most important iron-mines are in Bosnia (Vares, Ljubljana); copper is found chiefly in Serbia (Bor), as is antimony (Podrinje); chrome is found in Serbia (Kosovo, Metohija) and Macedonia (Skopje); the prin. lead-mines are at Trepcia, Mežice, and Litija; and bauxite is mined in Istria and at Bar. Petroleum and natural gas are also found. In 1954 the production of minerals was as follows (in metric tons): lignite, 12,675,000; coal, 988,000; bauxite, 687,000; iron ore, 1,111,000; copper ore, 1,299,000; lead and zinc ores, 1,485,000; chrome ore, 124,000; antimony ore, 75,200; petroleum, 216,300; manganese ore, 9,200. There are numerous spas. Industry is unevenly developed, and processing industries are still of the chief importance. Electrical equipment, motor cars, machine tools, aircraft, munitions, metal goods, jewellery, carpets, and tobacco are among the prin. manufs. The chief country from which Y. imports is the U.S.A., and the chief country to which it exports is

Italy. Trade with the U.K. in 1965 was valued at: imports into the U.K., £27,511,721; exports from the U.K., £29,268,916.

Communications. In 1954 there were 1970 miles of macadamised roads, and 30,534 miles of metalled roads. In the same year there were 7222 miles of railway track. The Yugoslav sea-going fleet in 1954 comprised 206 vessels, with a gross tonnage of 291,539; there were also 887 riv. vessels. The Yugoslav airline, *Jugoslovenski Aero Transport*, carried 63,635 passengers on its domestic routes in 1954, and 16,444 passengers on its international routes. The main civil airports are at Belgrade, Zagreb, Ljubljana, Sarajevo, Skopje, and Titograd.

Defence. The Yugoslav Army has 8 army corps of about 30 divs. The Air Force is being re-organised, and there is a Navy with destroyers, submarines, and minesweepers.

Currency, etc. All banking is in the hands of the State. The unit of currency is the *dinar*, divided into 100 *paras*. One *dinar* equals 2.96223 milligrammes of fine gold. Notes of 1000, 500, 100, 20, 10, 5, and 1 *dinar*(s) are issued, and coins of 5, 2, and 1 *dinar*(s), and of 50 *paras*. The metric system (q.v.) is in use.

National Flag. The national flag is blue, white, and red in horizontal stripes, with a red 5-pointed star in the centre.

History. (For hist. until 1918 see SERBIA; CROATIA; SLAVONIA; MONTENEGRO; MACEDONIA; see also BALKAN PENINSULA.) Y., until 1929 known as the Kingdom of the Serbs, Croats, and Slovenes, was created after the First World War from the former kingdoms of Serbia and Montenegro; Bosnia, Hercegovina, Dalmatia (except a small part which went to Italy), and parts of Styria, Carniola, and Carinthia from Austria; and Croatia, Slovenia, and Vojvodina (parts of Baranja, Baška, and Banat), from Hungary. It was declared a constitutional parl. monarchy under the hereditary king of Serbia, but dissension between Serbs and Croats broke out, and King Alexander I (see ALEXANDER), therefore, in Jan. 1929, abrogated the constitution, dissolved Parliament, and formed a cabinet composed of 16 members, responsible to himself alone. At the same time the country was renamed Y., and a new system of regional administration adopted. This period ended with the dictated constitution of 1931, which vested the legislative powers in the king, the senate, and the chamber of deputies. In 1934 Alexander was assassinated. During his son Peter's (b. 1923) minority, Alexander's brother Prince Paul was regent. Soon after the outbreak of the Second World War the subjugation of Y. became a necessity to Ger. strategy, and under great pressure, Prince Paul's Gov., on 25 March 1941, signed the tripartite anti-Comintern Pact (q.v.). This action was repudiated by the mass of the people. A new gov. was set up under King Peter and Gen. Simović which actively resisted the Germans; but Y. was unprepared for an invasion and the Ger. army penetrated the

Monastir gap and eventually occupied Belgrade (after bombing it heavily) on 13 April (see EASTERN FRONT, OR RUSSO-GERMAN CAMPAIGN IN THE SECOND WORLD WAR). In 1944 the defection of Rumania and Bulgaria, brought about by the Russian victories, put the Ger. armies in Y. and Greece in great danger. These armies began a difficult withdrawal, harassed by partisan forces which had carried out guerilla attacks on the Germans throughout their occupation of the country. The gov. of Peter II in exile had appointed a Serb, Gen. Mihailović

1945 Marshal Tito was acclaimed at the general election, and the exiled Peter II was deprived of his nationality and had his property confiscated. In 1946 the constitution of the Federal People's Rep. of Y. was adopted, and action taken to make Y. a fully Communist state. Industries and commercial undertakings were nationalised.

In 1939 the illegal Communist party had 20,000 members. Many were killed during the war; but by 1950 the membership had risen to over $\frac{1}{2}$ million, including large numbers of peasants, who had



Yugoslav National Tourist Office

BELGRADE: THE YUGOSLAV NATIONAL ASSEMBLY BUILDING IS ON THE RIGHT

(Mihailovich) (q.v.) commander-in-chief of what remained of the Yugoslav Army in the fatherland and had given him the post of minister of defence. A rival force to Mihailović's Cetniks (Chetniks) arose under the leadership of Tito (q.v.) a Croatian Communist. Up to mid-1943 allied assistance was given to Mihailović and then also to Tito, whose influence was increasing. In 1944 allied support was henceforth given exclusively to Tito, whose rise to supreme power was thenceforward uninterrupted, and effected with Soviet aid. In June 1946 Mihailović was tried as a collaborator and shot.

The constitution of 1931 was formally abrogated at Belgrade in Nov. 1944, when the Yugoslav Premier Subasić and Tito for the 'National Liberation Committee of Yugoslavia' signed an agreement recognising the provisional legislative powers of the National Liberation Council. In

fought under Tito against the Germans Unlike Mihailović, whose bias was not only monarchist but pro-Serb, Tito rallied all sections of Yugoslavs without racial distinction, insisting only on political uniformity, and achieved a unity which the monarchy had never been able to obtain. The poor were undoubtedly attracted by Tito's attacks on the large property-owners. The monarchy had never really attempted to deal with the pressing land problem. The social revolution which was carried out in Y. from 1945 altered the balance of Yugoslav society. The large property owners and some of the professional classes suffered a loss in status as well as income: on the other hand, the need for doctors, skilled engineers, architects and teachers became greater than ever before, and writers and artists enjoyed a privileged position, providing that they conformed to the

gov.'s political policy. Industry has been largely nationalised, and craftsmen encouraged to enter co-operatives. There is limited collectivisation of agriculture. The Five Year Plan launched in 1947 hoped to double the national income of 1939 by 1951, and aimed at the industrialisation of the country on a large scale by exploiting the rich deposits of raw materials and by setting up huge electric plants, etc. Great efforts have since been made to increase output both by modernising equipment and methods, and by giving awards for individual efforts. Sev. ambitious building projects have been carried out by the Communist régime, but in 1958 the housing conditions of many Yugoslavs were still below the general living standards of most countries of W. Europe.



Yugoslav Embassy

A GIRL FROM SLOVENIA

The economic blockade launched against Y. by the Cominform countries in 1948 appeared to threaten the Five Year Plan, but Tito then made trade agreements with sev. W. European countries, and claimed that the plan would not be affected. In autumn 1950, however, it was apparent that a bad harvest had added substantially to the economic difficulties under which Y. was labouring.

The peace treaty with Italy, signed in Paris in Feb. 1947, stipulated the cession to Y. of most of the It. prov. of Venezia Giulia, the commune of Zara, and the is. of Pelagosa. The Free Ter. of Trieste was constituted under section III of this treaty as a compromise to the city and its port. In Oct. 1954, as a result of the agreement initialled in London between

the Brit., U.S.A., It., and Yugoslav Govs., the Trieste ter. administered by the Yugoslav Military Gov. since the end of the Second World War, plus a small additional strip of ter., passed under Yugoslav civil administration, and thus became definitely a part of Y. See TRIESTE.

Early in 1948 a bitter political conflict between Y. and Russia broke out when the Kremlin, acting through the Cominform (q.v.) called on Yugoslav Communists to depose certain of their leaders who refused to be bound by Moscow's discipline. Later, in 1949, the Soviet Gov. directly challenged and threatened the authority of the Yugoslav Gov. Political and economic life in Y., 1948-53 was completely dominated by Tito's quarrel with the Cominform (see also TITRO). Early in the dispute the Cominform had expelled Tito and urged the Yugoslav people to throw him out of office if he did not change his policy, but the quarrel had the effect of arousing the nationalism of the Yugoslavs and gave Tito support from sections of the pop. who were probably antagonistic to his economic policy. The Russians then instigated an economic blockade of Y.; Tito therefore sought and obtained economic aid from Britain, France, the U.S.A., and the World Bank. Y. was thus able successfully to assert her independent status against Soviet claims, but while economic necessity forced her to trade with the W., her domestic policy continued to be conducted on generally Marxist lines, though with the emphasis on the 'peasant proletariat' rather than on the urban workers, and with rather less severity than was usual in a Communist state.

Nevertheless, between 1948 and 1953 there were significant modifications in the pattern of Yugoslav Communism. Decentralisation measures affected the structure of industry, agriculture, and local gov., and the revised constitution of 1953 provided in theory for considerably greater local autonomy than had previously been considered permissible. In 1951 Archbishop Stepinac (q.v.) was conditionally released from prison, but 2 years later he was not able to leave the country to receive his cardinal's hat. In March 1953 Tito visited Britain.

After the death of Stalin (1953) relations between Y. and Russia gradually improved, though Tito continued to insist on Y.'s independence of both the E. and the W. blocs. In June 1955 Tito, Bulganin, and Khrushchev signed a declaration of friendship and co-operation. In spite of W. aid, Y.'s economic position remained precarious, and Russia now made tempting offers of generous economic aid.

In Oct.-Nov. 1956, Y. supported the condemnation of Anglo-Fr. intervention in Egypt (see SUEZ CANAL). But Y. gave temporary asylum to thousands of Hungarian refugees after the unsuccessful anti-Russian rising in Hungary (see HUNGARY, *History*), and there was a noticeable coolness between Y. and the other Communist states for some time after this. In Aug. 1957 Moscow Radio

announced that a meeting had taken place between Khrushchev and Tito, and once again Russo-Yugoslav relations seemed to be improving.

Tito's repeated insistence that Y. was to continue as a Marxist state was underlined by the trial, in Oct. 1957, of his former political associate Mlovan Djilas, who was sentenced to 7 years' imprisonment for 'spreading propaganda hostile to the state.' Only the relatively lenient sentence made this trial any different from the political trials held in other communist countries. In Oct. 1957 Y. recognised the Ger. Democratic Rep. of E. Germany; as a result, in Nov. the Federal Ger. Rep. broke off diplomatic relations with Y.

The unique position of Y. in world politics since 1948 is very largely the personal achievement of Tito, whose influence over his country's affairs remains paramount. He has been President of the rep. since 1953.

Yugoslav Languages. Apart from the languages of minorities (e.g. Albanian, Hungarian, Italian), there are 3 languages spoken in Yugoslavia: Slovene, Serbocroatian, and Macedonian (elevated to the status of a language in 1943). They are members of the S. Slavonic group and have developed from the common S. Slavonic language spoken by the first Slav settlers in the Balkans at the beginning of the 7th cent. Slovene and Serbocroatian have a musical accent, Macedonian has a stress accent. Slovene preserves the dual and the supine, Macedonian has several suffixed definite articles. Croatian is the language of the Croats and Serbian that of the Serbs, and the standard forms of the two are now nearly identical, and they are now considered one language, Serbocroatian. Slovene and Croatian are written in the Latin alphabet, most Serbian and Macedonian in Karadžić's modified Cyrillic.

Slovene Literature. The earliest Slovene document dates from about AD 1000, but a literature started only with Primož Trubar, the protestant reformer who pub. the first books printed in Slovenian (1551 in Tübingen). But the greatest work of the reformers was the trans. of the Bible pub. by Jurij Dalmatin, a follower of Trubar's, in 1584. The Counter-Reformation, which destroyed all Protestant hopes in Slovenia, had to continue the work started by the Protestants, providing devotional books in Slovenian. The Austrian educational reform, 1760, led to the appearance of text-books in Slovenian and soon to a Slovene renaissance. Baron Zois (1747-1819) was the leader of a cultured group which included Valentin Vodnik (1758-1819), poet and producer of the first Slovene newspaper; Anton Linhart (1757-95), historian; and Jernej Kopitar, who wrote the first scientific Slovene grammar (1808) and laid the foundation of Slavonic studies. Still, no environment can explain the perfection of Francé Prešeren's poems (collected and pub. 1846). The growing nationalism after 1848 increased Slovene literary activity, but could not raise it to

Prešeren's heights: e.g. J. Bleiweis (1808-81), journalist, S. Jenko (1835-69), Fran Levstik (1851-87) and Josip Sritar (1836-1923), poets. Levstik and Sritar were also novelists. The foundation of the journal *Ljubljanski zvon*, 1881, marked a turning from romanticism towards realism. Its contributors included the fiction writers Tavčar, Kersnik, and Trdina, and the poets Gregorčič and Aškerc. From 1900 symbolism gathered strength, e.g. the work of Kette, Murn-Aleksandrov, Zupančič, and Ivan Cankar. By 1918 a new psychological realism was taking its place, e.g. the work of I. Pregelj, Francé Bevč, and J. Kozak. The War (1941-45) and the Communist success brought out new trends. Prežihov Voranc (1893-1950), who wrote before the War as well, was the outstanding figure of the post-war period.

Serbocroatian Literature. Medieval Serbian literature, mainly religious and written in Church Slavonic, was cut short by the Turkish conquest. The coast was not conquered; therefore Dalmatia was able to share in the It. renaissance and developed from the end of the 15th cent. a secular literature, strongly influenced by Italian, in Croatian, e.g. Marko Marulić of Split, Hanibal Lucić and Petar Hektorović of Hvar, Petar Zoranić of Zadar, and Šiško Menčetić, Džore and Marin Držić, Dinko Ranjina, and Dominko Zlatarić of Dubrovnik. After Gundulić's death (1638) there was a decline. In Croatia the missionaries of the Counter-Reformation were active in the 17th cent. Their best service to literature was the production of a grammar (1654) and a dictionary (1659). The Serbian revival started in Vienna and Budapest, centres for Serbians who, to escape Turkish rule, had fled and settled in Austria and Hungary. The need for general education was partly supplied by Rajić (1726-1801), the historian; Zaharije Orfelin (1726-85), publisher and writer on practical things, bee-keeping, hand-writing, etc.; and Dositej Obradović (1742-1811), who travelled widely and whose autobiography is still read with pleasure.

The Illyrian movement which aimed at the unification of the S. Slav languages and literatures was Croatian in origin and organisation, and certainly the adoption of the *što* dialect, used by Serbs, as the Croatian literary language, made later Serbocroatian unity possible. Among the Illyrians were the poets Stanko Vraz (1810-51) a Slovene, Petar Preradović (1818-72), and Ivan Mažuranić (1814-90). The chief moulder of Serbian was Vuk Karadžić (1787-1864), collector of folk literature (most of which was common to Serbs and Croats), lexicographer and reformer of the alphabet. He secured the adoption of the Serbian spoken by the Serbian peasants of Hercegovina as the foundation of the literary language and the rejection of the archaizing and Russified Serbian written by the Serbs in Austria and Hungary. Space does not allow an adequate review of the many subsequent trends: suffice to mention the following. The outstanding Serbian work

of the cent. was *Gorski Vjenac*, 1847, an epic of patriarchal Montenegro by Petar Petrović Njegoš, the prince-bishop of Montenegro. Zagreb became, with the Bishop Strossmayer's foundation of the Yugoslav Academy (1867) and the Univ. (1874), the cultural centre of Croatia; and August Senoa (1838-81) with his historical novels was the typical, and the greatest, novelist of Zagreb. But romanticism and the succeeding realism gave way in the 20th cent. to more classical conceptions, e.g. in Ivo Vojnović (1857-1929), the dramatist, and Vladimir Nazor (1876-1949). Independently in Serbia a panslavist movement had started with Milan Rakić and Jovan Đutić (1874-1943). After the formation of Yugoslavia, Serbian and Croatian literature grew closer together, and the scene was dominated by Miroslav Križeva (1893-). The Second World War brought great changes, but so far writers seem to enjoy a little more freedom than in some other Communist countries.

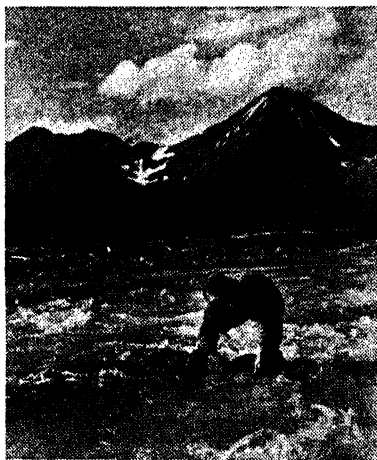
Macedonian Literature. The Macedonian language was always considered a dialect of Bulgarian or of Serbian. Isolated religious books had been pub. in it from 1814. Collections of folk material were pub. in Zagreb in 1861 and in Sofia from the end of the 19th cent. Between the Wars there was some original writing, e.g. Iljoski, Racin, Markovski, Nedelkovski. After its recognition as an independent language, and the creation within Yugoslavia of the Macedonian Rep., there has been a great growth in literary activity. See H. G. Lunt, 'Survey of Macedonian Literature,' in *Harvard Slavic Studies*, Vol. I, 1953.

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Yukaghir, aboriginal tribe of NE. Siberia, N. of the Verkhoyansk and Stanovoi mts. They hunt reindeer, but do not domesticate them, and are, apart from the Eskimo, the only purely hunting and food-gathering people of Arctic Asia. See D. Forde, *Habitat, Economy and Society*, 1934.

Yukon: 1. Ter. of NW. Canada, with an area of 205,346 sq. m. (land) and 1730 sq. m. (water). The N. and W. are mountainous, but in some places the valleys can be utilised for growing crops. The chief forest trees are spruce, poplar,

birch, cottonwood, and balsam. Y. owed its prosperity to the discovery of the gold mines in the Klondike region, and mining is the prin. occupation. Silver and lead are the other chief minerals. Total mineral output to the end of 1946 was \$242,750,000. All the mining operations take place some distance outside Dawson City in the Klondike valley and its trib. creeks. In 1947, 47,750 oz. of gold valued at £417,800 was recovered in the Y. Fishing and lumbering are other industries. Fur output averages \$500,000 annually. Within the boundaries of the Klucane Lake Federal Game Sanctuary is the Mt St Elias range, with Mt Logan (19,539 ft). The Y. Ter. was constituted a separate political ter. in 1898. It is governed by a resident Commissioner and an elective Legislative Council of 5 members. The Commissioner administers the gov. under instructions from the Governor-General in Council or the Minister of N. Affairs and Natural Resources. The seat of gov. is Whitehorse



National Film Board, Canada

YUKON

Panning for gold, near Whitehorse.

(pop. 2594). The pop. of Y. Ter. is about 9000, having declined considerably from over 27,000 in 1901. There are 58 m. of railway, but the Y. River is the greatest channel of communication from the coast to the interior. There are 2000 m. of motor and other roads in addition to the Alaska Highway. (See under ALASKA.) See N. A. D. Armstrong, *Yukon Yesterdays: Thirty Years of Adventure in the Klondyke*, 1906; *Yukon: The Land of the Klondyke*, 1929, and *The Yukon Territory: Administration, Resources, Development*, 1947, both pub. by the dept of Mines and Resources, Ottawa.

2. Riv. of the Yukon Ter. and Alaska, formed by the junction of the Lewis and

Pelly rivs. Length 2300 m. The riv. is navigable, in the summer, for 3-ft-draught steamers from Whitehorse to the Bering Sea (1770 m.). It was first explored from source to mouth in 1883 by F. Schwatka.

Yulan, *see* MAGNOLIA.

Yungchi, *see* KIRIN.

Yungning, *see* NANNING.

Yunnan, SW. prov. of China, bounded on the N. and E. by Szechwan, Kweichow, and Kwangsi, and on the S. and W. by

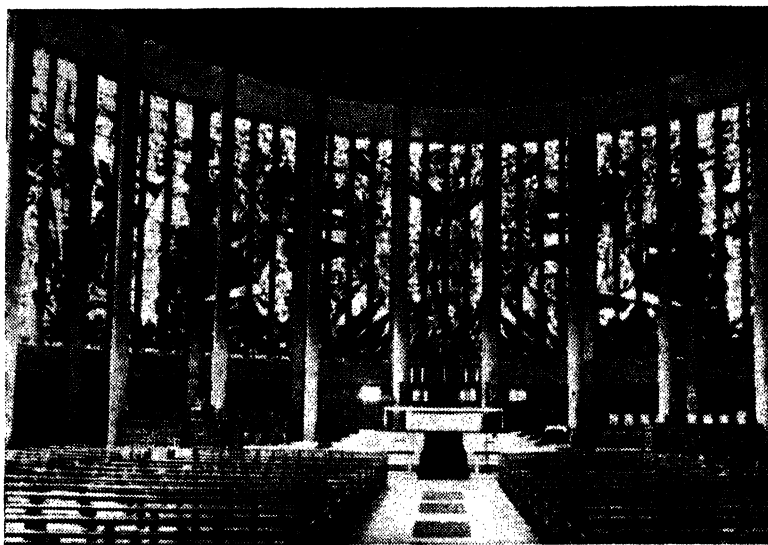
Road). In addition to the Kunming-Haiphong railway, 2 new ones, one to Chengtu (Szechwan) and the other to Kweiyang, are being built in 1957. The long-standing problem of the frontier between China and Burma was settled in 1956.

Yur'yev, *see* TARTU.

Yusuf-ibn-Tashfin, *see* ALMORAVIDES.

Yuzovka, or Yuzovo, *see* STALINO.

Yverdon, tn and spa in the canton of Vaud, Switzerland, at the SW. end of



Cliché Combier à Macon

INTERIOR OF THE CHURCH OF ST PIERRE, YVETOT

Indo-China, Burma, and Tibet. Area 153,864 sq. m. The surface is mainly a lofty, uneven plateau, broken by mt ranges and the gorges of rivs. The mts are highest in the N., where they reach 17,000 ft, sinking to 7000 or 8000 in the S. The chief rivs. are the Salween, Yangtsekiang, and Me-kong. The plains and valleys are fertile, and agriculture and stock-raising are largely carried on, particularly in the S. and SW. Excellent tea, tobacco, and silk are produced. The mineral wealth is considerable and includes copper ore and tin ore, which have been mined for many years, gold, silver, lead, tin, jade, and anthracite. Pop. 17,472,737 (1954). The cap. is Kunming (Yunnan-fu). Among the prin. roads in China is that which runs from Kunming in Y. to Lashio in Burma (the Burma

Lake Neuchâtel. It is built on the site of the Rom. tn *Eburodunum*. At the beginning of the 19th cent. its castle was the home of Pestalozzi's (q.v.) school. Pop. (1955) 14,100, Fr. speaking Protestants.

Yvetot, Fr. tn in the dept of Seine-Inférieure. In the 14th-16th cents. the lord of Y. was called the King; one of the satiric songs of Béranger (q.v.) is entitled *Roi d'Yvetot*. There is a mrkt, and mustard, cotton goods, and hats are manu. In the remarkable round church of St Pierre, built in 1556, Max Ingrand has executed a great stained glass window forming an almost complete circle, representing Christ on the Cross and all the saints of the diocese of Rouen. Pop. 6800.

Y.W.C.A., *see* YOUNG WOMEN'S CHRISTIAN ASSOCIATION.

Z, twenty-sixth and last letter of the Eng. alphabet. In the N. Semitic alphabet (as well as in modern Heb.) it occupies the seventh place; in the Gk alphabet it occupies the sixth place. The Etruscans took it over from the Greeks, and the Romans borrowed it from the Etruscans. Thus, the early Lat. alphabet contained the letter Z (Z), which then occupied the seventh place, but at a later stage it was dropped, because Latin did not require it, and the letter G, created in 312 bc out of the letter C, was placed in its position. When, after the conquest of Greece (1st cent. bc), Gk words were largely borrowed by the Lat. language, a new z (Z) was adopted for the sound z (but only to transliterate Gk words) and was placed at the end of the Lat. alphabet, from which it has been transferred to alphabets of W., S., N., and Central Europe. The phonetic value of z is that of a voiced sibilant, like the s in 'singer,' but in some languages it may have the value of ds or ts. See ALPHABET.

Zaandam, port and tn in the prov. of N. Holland, the Netherlands, on the R. Zaan, 5 m. NW. of Amsterdam. It has a great number of saw-mills, and manufs. paper, metals, glue, and dyes. Pop. 45,700.

Zabalkanski, Count, see DIEBITSCH.

Zabern, see SAVERNE.

Zabkowice Slaskie (Ger. Frankenstein), tn of Poland, in Wroclaw prov., at the E. foot of the Eulengebirge, 40 m. SSW. of Wroclaw (q.v.). It has a textile industry and nickel mines. Pop. 11,000.

Zabrze (Ger. Hindenburg), tn of Poland, in Katowice prov., 11 m. WNW. of Katowice (q.v.). Until 1945 it was in Upper Silesia (q.v.). It has coal mines, and steel, engineering, glass, and chemical industries. Pop. 133,000.

Zacatecas: 1. State of N. Mexico; area 28,120 sq. m. It is rich in silver and other minerals, including gold, copper, and zinc, Fresnillo being the best-known centre. In the N. and E. are extensive cattle ranches. Every kind of cactus abounds. Pop. 665,524.

2. Manufacturing city, cap. of Z. state, a centre for silver mining. Altitude 8075 ft. It has a cathedral, a mint, and an observatory. It became a city in 1585, being founded in 1546. There is a railway junction and an airfield. Pop. 21,800.

Zachariah: 1. See ZECHARIAH.

2. Father of John the Baptist. All that is known of him is contained in Luke 1. He was about to offer incense as priest in the Temple, when the angel Gabriel appeared to him and foretold that his ageing wife Elizabeth should bear a son. Z. for doubting was struck dumb. After the birth of the child he named it John as the angel had commanded, and, recovering his speech, uttered the well-known Canticle *Benedictus*.

Zachary, St (d. 752), Pope, b. at San Severino, Calabria, of Gk parentage. He succeeded Gregory III as Pope in 741, and in that capacity exercised considerable political influence. He negotiated peace between the Lombards and the Greeks, confirmed Pepin the Short as King of the Franks, encouraged the missionary work of St Boniface, and did much for the Benedictine order. His feast day is on 22 Mar.

Zachtleven, Cornelis, see SACHTLEVEN.

Zacynthus (It. Zante), one of the Ionian is. and a dept of Greece, 8 m. S. of Cephalonia. Some gypsum is quarried. The chief product is the vine. The cap. is the small port of Z. in the SE., which is a centre of cable communications. Area 155 sq. m.; pop. (18.) 38,000; (19.) 11,100.

Zadar (It. Zara; Rom. Iadera), seaside resort and port in Croatia, Yugoslavia, on a peninsula of the Dalmatian coast. It was conquered by Venice in the 15th cent., went to Austria in 1797, and was ceded to Italy by the treaty of Rapallo (q.v.) in 1920. Under the It. peace treaty of 1947 it became part of Yugoslavia. It was badly damaged during the Second World War, but has been restored. There are Rom. remains, a 14th-cent. cathedral, a palace, and sev. fine churches. Maraschino liqueur, glass, and wax are manuf. Pop. 18,900.

Zadkiel, pseudonym of Richard James Morrison (1795-1874), Eng. astrologer, who founded, in 1831, *The Herald of Astrology*, which, afterwards issued yearly as *Zadkiel's Almanac*, attained great popularity.

Zagan (Ger. Sagan), tn of Poland, in Zielona Góra, on the Bobrawa (q.v.), 25 m. SSW. of Zielona Góra (q.v.). It was formerly in Ger. Lower Silesia (q.v.). It was the cap. of a principality, 1274-1472. There is a 17th-cent. palace built by Wallenstein (q.v.), and there are lignite mines and a textile industry. Pop. 9000.

Zaglul Pasha (1860-1927), Egyptian politician and lawyer. As premier he headed the Wafd which brought about the independence of Egypt. See EGYPT, *Modern History*.

Zagorsk (until 1930 Sergiyev), tn in the Moscow Oblast of Central Russia, 44 m. NE. of Moscow. It is the centre of an old (since 15th cent.) wood-carving and toy-making craft. The famous Trinity Monastery of St Sergius (see TROITSK-SERGIYEVA LAVRA), founded in 1337, is now a museum and residence of the Patriarch of Moscow. Pop. (1931) 24,000. Originally an extra-mural settlement of the monastery, Z. became a tn after 1917.

Zagreb (Ger. Agram), cap. city of the rep. of Croatia (q.v.), Yugoslavia, on the Sava. It has been the cultural centre of the Croats since 1557, and is the second city of Yugoslavia. It is divided into 3 parts, the *Kaptol* (originally an ecclesiastical

colony), and the High and Low tns. and its streets and buildings are a mixture of medieval, Baroque, and modern. It is the seat of Rom. Catholic and Orthodox archbishops, has a cathedral (rebuilt in the 19th cent.), a univ., libraries, museums, and theatres, and fine parks and boulevards. It manufs. textiles, machinery, paper, carpets, asbestos, and electrical equipment, and it is an important centre of communications. Pop. 350,500.

Zaharoff, Sir Zacharias Basilios (1850-1936), financier, b. Constantinople, of mixed Russian and Gk parentage, educ. in London and Paris. Little is known of his life, but he amassed a great fortune, giving away considerable sums, establishing chairs of aviation at Paris, Petrograd (now Leningrad), and London Univs., and endowing a professorship of Fr. literature at Oxford and a chair of Eng. literature at Paris. He had extensive interests in armament and engineering companies, banking, and oil concerns. G.B.E. 1918; G.C.B. 1919.

Zahedan, dist. and tn of E. Persia. The tn, formerly called Dozdab, has transit trade with Pakistan, with which it is connected by railway. Pop. (of tn) 17,500.

Zakopane, tn of Poland, in Crakow prov., in the Tatra Mts, 50 m. S. of Crakow (q.v.). It is a popular mt health resort (altitude 2920 ft) and winter sports centre. Pop. 14,000.

Zakynthos, see ZACYNTHUS.

Zala County, see ZALAEGERSZEG.

Zalaegerszeg, tn of W. Hungary, cap. of the co. of Zala, on the R. Zala, 115 m. SW. of Budapest (q.v.). It is the centre of a picturesque dist. called *Góraszeg* (confusion), and has oil refineries and clothing manufs. Pop. 14,000.

Zalew Szczecinski, see STETTINER HAF.

Zalt-Bommel, charming little tn in the prov. of Gelderland, Netherlands, situated on the R. Waal, 21 m. SSE. of Utrecht.

Zama, anct tn in Numidia, N. Africa, 70 m. SW. of Carthage, scene of Scipio's victory over Hannibal (202 bc) which ended the Second Punic War.

Zambales, prov. in central Luzon, Philippines. It is crossed by the Zambales Mts. The chief crop is rice, and there are chromite mines. The cap. is Iba. Pop. 138,536.

Zambezi, or **Zambesi**, riv. of Africa, extending mainly through N. and S. Rhodesia—being the territorial boundary between the two countries from near Shesheke to Feira (N. Rhodesia)—and Mozambique, about lat. 16° S. It has a length of about 1600 m., but its navigation is poor in proportion to its size. It has 3 navigable sections, but they are divided by impassable barriers. Its drainage area is about 520,000 sq. m. It rises on sev. streams in NW. Rhodesia, Angola, and the Belgian Congo. Its general course is SE. through the Barokli Valley to the Victoria Falls (q.v.): from here the riv. bends NE. and E. nearly to Tete (Mozambique), when it resumes a SE. course to the delta, situated some 200 m. NE. of Sofala in the Mozambique

Channel. Its volume is greatly increased by the Shire bringing the waters of Lake Nyasa. The riv. is navigable for 120 m. from its mouth, though with difficulty in the dry season, and for special riv. steamers (stern-wheel) up to Tete, and on the R. Shire to Chirimo (Nyasa-land). Below Tete the Lupata Gorge has a width of about 200 yds and a very strong current. Features of the Z. in its upper reaches are the Kanzalo Rapids and the Kariba Gorge (q.v.) in S. Rhodesia. The chief tns or townships on its banks are: Kazombo (in Angola near the source), Balovale, Lealui, Livingstone, Meumba, Boruma, and Feira, all in N. Rhodesia; and in Mozambique: Zumbo, Chikoa, Tete, Benga, Sena, Inyangama, Mopeia, Chinde, and Quillimane. Livingstone was the first explorer of the upper riv., between 1851 and 1853; he discovered the Victoria Falls (1855) during his descent of the riv. to its mouth. See D. and C. Livingstone, *Expedition to the Zambezi and its Discovery of Lakes Shirwa and Nyasa*, 1865; Lord Hailey, *An African Survey*, 1957.

Zamboanga, cap. and port of the prov. of Zamboanga, Mindanao is., Philippines. It was originally an old Sp. fortress. Copra, coconuts, rubber, lumber, etc., are exported. Pop. 103,317.

Zamenhof, Ludwig Lazarus (1859-1917), Polish-Jewish inventor of Esperanto (q.v.), b. Bialystok. See life by E. Privat, 1920 (trans. 1931).

Zamia, genus of fern-like palms, family Cycadaceae, mostly of tropical America and W. Indies. The underground parts are sometimes ground into flour and prepared for making cakes, etc.

Zamora: 1. Sp. prov., in León (q.v.), on the Portuguese frontier. It is watered by the Duero (q.v.) and its tribs. Its flocks produce much of Spain's merino wool. Area 4099 sq. m.; pop. 320,350.

2. Sp. tn, cap. of the prov. of Z., on the Duero. It has a fine 12th-cent. Romanesque cathedral, the bell-tower of which is still unfinished, many other old churches, walls, anct houses, and a castle. Textiles, pottery, and wine are manuf. Pop. 40,000.

3. Tn in central plateau state of Michoacán, Mexico, on the Z. R., 200 m. WNW. of Mexico City. Pop. 15,450.

Zamora y Torres, Niceto Alcalá (1877-1949), Sp. statesman, b. Prigo and educ. at Granada and Madrid univs. He held office in sev. govts. as a monarchist. Later, he became a republican, and Liberal leader. Z. was elected first president of Spain in Dec. 1931. With the formation of the 'Popular Front' the moderate and pacific counsels of Z. were ignored, and, in April 1936, a Socialist motion in the Cortes censuring the president was carried and he resigned.

Zancle, see MESSINA.

Zanesville, city, co. seat of Muskingum co., Ohio, U.S.A., on R. Muskingum, 52 m. E. of Columbus. It manufs. tiles, pottery, iron and steel, and glass, and has an Art Institute. Pop. 40,500.

Zangwill, Israel (1864-1926), novelist, b. London of Jewish parentage. Educ. at London Univ., he pub. a series of masterly

studies of Jewish life and history, of which the best known is *The Children of the Ghetto*, 1892; it was followed by *Ghetto Tragedies*, 1893, *The King of the Schnorrers*, 1894, *Ghetto Comedies*, 1907, and *Chosen People*, 1918. *Dreamers of the Ghetto*, 1898, is a collection of essays on notable Jews of history. Z. also wrote a number of plays.

Zante, see ZACYNTHUS.

Zantedeschia, (synonym *Richardia*), family Araceae, genus of S. African marsh plants with thick rhizomes, of which *Z. aethiopica* (synonyms *Calla aethiopica*, *Richardia africana*), with arrow-shaped leaves, and creamy-white spathe, and its varieties, are grown in gardens, and known as Lily of the Nile, Arum Lily, Calla, and Trumpet Lily.

Zanzibar, Brit. protectorate, is. and tn off the E. African coast. The protectorate is composed of the is. of Z., the is. of Pemba (q.v.), and sev. small is. The is. of Z. is off the coast of Tanganyika, separated from the mainland by a narrow channel which, at one point, is about 23 m. wide. Pemba is 30 m. to the NNE. Z. is the largest coralline is. on the E. African coast. The climate of Z. is tropical, but the heat is tempered by constant sea-breezes which blow with great regularity except during the change of the monsoons. Pop. (latest figures available, 1948), 264,162 (Europeans, 296; Arab, 44,560; Indian, 15,892; African, 199,860; others, 3554). Distribution between the two prin. is. is Z., 144,575; Pemba, 114,587. (45,300 of the pop. of Z. is. live in Z. tn.) With 250 persons to the sq. m. Z. protectorate is one of the most densely populated countries in Africa. The prevailing native religion is Moslem. There are Christian missions.

Production and Industries. Apart from *entrepôt* trade, Z. is mainly dependent on its agric. and marine products. The chief agric. industry is the cultivation of cloves. Cloves are produced by individual Arab, Indian, and African agriculturalists on their own plantations, and picking is done by hired African labour. Export is normally in the form of dried bulbs, or oil distilled mainly from the stems. The spread of 'Sudden Death' disease in clove-trees has been enraging the attention of the gov. during the last few years, and a Clove Research Dept has been set up. The coconut industry is also important, copra being one of the main exports. It is largely produced by the Omani Arabs. Mangrove bark used in the tanning industry is also exported. Other exports are chillies, citrus and other fruits, and coll-tobacco. There are 3 small forests, which yield 'Mvule' timber. Fishing is a prominent activity, the fish being mostly consumed locally, though dried shark is exported. The manuf. of oir fibre and rope by hand is fairly extensive in the coastal areas. Other industries are clove-oil distilling, coconut expression, and the manuf. of soap. In 1953 162,918 cwt. of cloves valued at £6,011,197, copra valued at £403,712, and coconut oil at £465,990, were exported. It is estimated that there are

50,000 ac. under cloves in the protectorate. Percentage of imports from the U.K. (1953) 34.71 per cent; exports to the U.K. 6.18 per cent.

Administration. The gov. is administered by the Brit. Resident, who exercises his functions under the Z. Orders in Council, 1924 and 1925. The Sultan legislates by decrees which, when countersigned by the Resident, have the force of law. The executive council is presided over by the Sultan, and the Legislative Council by the Resident. The Legislative Council consists of 4 *ex-officio* and 5 official members. There are 8 unofficial members: 3 Arab, 2 Indian, 2 African, and 1 European. It is the administrative policy to develop amongst the people a system of local gov. through local councils, which are being set up in suitable areas.

Social Welfare. Primary education is free in the gov. primary schools, which admit only Arabs and Africans. In 1955 there were 8089 boys and 2588 girls in primary schools, and 252 boys and 103 girls in gov. secondary schools.

Law. Eng. common law is administered by the courts where applicable. In the Sultan's courts the law of Islam is regarded as the fundamental law in civil matters. There has been no comprehensive publication of the laws of Z. since 1934.

Z. tn is situated on the W. coast of Z. is. It is the largest tn in E. Africa, and has an Arabic character. It was once the greatest slave-mkt in the world. It has a good harbour, which presents excellent facilities for shipping and trade generally. Pop. (1948) 45,300. Other tns in the protectorate are Wete, Chake Chake, and Mkoani, all in Pemba Is.

History. The beginnings of the hist. of Z. are lost in antiquity. It is probable that the is. of Z. and Pemba had a close connection with S. Arabia prior to the Christian era and that Bantu settlers from the mainland of Africa occupied the is. at about the same time. Thereafter traders from Arabia, the Persian Gulf, and the E. coast of India began to visit the place. In about the 10th cent. of the Christian era the inhabitants of Z., Pemba, and the adjacent mainland became converts to Islam. At the end of the 15th-cent. Z. was ruled by a 'king' of 'Moorish' (i.e. mixed African and Asiatic) descent. Pemba was at that date said to be ruled by 5 'kings' of similar origin. In the early days of the 16th cent. the Portuguese set about the conquest of the E. African littoral and made the is. of Z. and Pemba tributary to the Portuguese crown. Although the inhab. were more than once in a state of rebellion, Pemba remained tributary until the final expulsion of the Portuguese. On the other hand, Z. very soon ceased to pay tribute, and thereafter its 'king' was treated as a friendly ruler, who permitted the Portuguese to erect a factory and a church in his dominions.

Portuguese supremacy in E. Africa came to an end in 1698 with the capture of their fort at Mombasa by the Arabs of

Oman. Thereafter Z. and Pemba remained under the nominal supremacy of Oman for rather more than a cent. After the accession in 1804 of Seyyid Said bin Sultan to the throne of Oman, definite measures were taken to assert Omani supremacy in E. Africa. In 1829 Seyyid Said transferred his cap. from Muscat to Z. Thereafter he made Z. his permanent residence and laid the foundations of the prosperity of the is. by promoting trade with European and Amer. countries and with the Lake regions of Central Africa and by the introduction of cloves and other economic crops into Z. and Pemba. At his death in 1856 he left his African dominions to his son Majid and those in Asia to his son Thuwein. A dispute arose between the two brothers which was referred to the arbitration of Lord Canning, governor-general of India, who in 1861 made an award declaring the African possessions of the late Seyyid Said to be independent of Oman.

Majid was succeeded in 1870 by his brother Barghash. In 1873 and 1875 Barghash concluded treaties with Great Britain which declared the sea traffic in slaves within and from Z. dominions to be illegal. In 1886 a *procès verbal* signed by Lieut-Col. (afterwards Earl) Kitchener as delegate of Great Britain and delegates from France and Germany, and subsequently ratified by the delegates' respective govts., defined the maritime, littoral, and continental possessions of the sultan of Z. The is. of Z., Pemba, and Mafia were recognised as being under the sultan's sovereignty and certain strips of the coast between Cape Delgado and Lamu to a depth varying from 5 to 10 m. were recognised as forming part of his dominions. In 1888 Barghash's successor, Khalifa, granted to a Ger. E. African Company a lease of the whole of the coast-line (including Mafia), of what is now Tanganyika. In the same year a similar lease was granted to the Imperial Brit. E. Africa Company (I.B.E.A. Co.) of the sultan's dominions to the N. of the Ger. concession. The Ger. company's concession was eventually taken over in 1890 by the Ger. Gov., who bought the sultan's rights for 4,000,000 gold marks. The I.B.E.A. Co.'s concession was taken over by the Brit. Gov. in 1895, and the ter. comprised therein is now known as the Kenya Protectorate.

In 1890 Khalifa placed his dominions under Brit. protection and also abolished all traffic in slaves within those dominions. In the following year a regular gov. was constituted with a Brit. representative as first minister. On the death of the Sultan Hamed bin Thuwein in 1896, Seyyid Khalid, another member of the family, seized the royal palace, and it was found necessary for Brit. warships to bombard the palace in order to compel his submission. Sultan Hamed was succeeded by Hamud bin Muhammad. In 1897 the status of slavery was finally abolished in Z. In 1906 the Brit. Gov. assumed more direct control over the Protectorate and reorganised the gov. In 1911 Seyyid Ali, who had succeeded his

father Sultan Hamud in 1902, abdicated and was himself succeeded by Seyyid Khalifa bin Harub, the present ruler of Z. In 1913 the control of the Z. Protectorate was transferred from the Foreign Office to the Colonial Office. In 1914 a Protectorate Council was formed with the sultan as president. This body was purely of an advisory and consultative nature and was replaced in 1926 by executive and legislative councils.

Architecture. The architecture of Z. is distinctively saracenic, and in accordance with the wish of the sultan this traditional form has been scrupulously maintained in most of the public buildings. With narrow streets and tall houses, Z. presents a typically Eastern appearance. The houses are embellished with carved doors, for which the is. is justly famous. See R. F. Burton, *Zanzibar: City, Island, and Coast*, 1872; H. N. Ridley, *Spices*, 1912; C. H. Stigand, *The Land of Zinj: Its Ancient History and Present Inhabitants*, 1913; F. B. Pearce, *Zanzibar, the Island Metropolis of East Africa*, 1920; R. Said-Ruete, *Said bin Sultan*, 1929; W. H. Ingrams, *Zanzibar, its History and its People*, 1931, and *Arabia and the Isles*, 1952; R. H. Crofton, *A Pageant of the Spice Islands*, 1936, and *Zanzibar Affairs, 1914-33*, 1953; Sir R. E. Coupland, *East Africa and its Invaders*, 1938; also the following gov. pubs.: *Zanzibar Protectorate*, 1931; B. H. Binder, *Report on Zanzibar Clove Industry*, 1936; R. O. Williams, O.B.E., *The Useful and Ornamental Plants of Zanzibar and Pemba*, 1949; *A Guide to Zanzibar*, 1949; and G. E. Tidbury, *The Clove Tree*, 1949.

Zapolska, Gabriela (1860-1921), Polish writer. Her father was a landowner, her mother an opera-singer. After an unsuccessful marriage she spent a few years on the stage, then devoted herself to writing, especially plays. Her works often deal with the position of women and expose the hypocrisy of middle- and upper-class morality. Her best-known work is *Moralność Pani Dulskiej* (*The Morality of Mrs Dulski*), 1907.

Zaporogians, see COSSACKS; SICH.

Zaporozh'ye (Ukrainian *Zaporizhzhya*): 1. Oblast in SE. Ukraine, between the Dnieper bend and the Sea of Azov, largely Black Earth lowland steppe with lignite deposits. There are large metallurgical, engineering, chemical, and food industries; wheat, sunflowers, and cotton are grown, and there is mkt gardening (melons). The prin. tns are Z., Melitopol', and Osipenko. The first non-nomadic pop. was the Ukrainian Cossacks who in the late 16th cent. estab. the Sich community (see SICH) on the Dnieper bend (for further hist. see NEW RUSSIA). From 1917 to 1921 Z. was the centre of the Anarchist movement led by Makhno (q.v.). Area 10,400 sq. m.; pop. (1956) 1,393,000, Ukrainians and Russians (before the war also Jews and Germans).

2. (until 1921 Aleksandrovsk) Cap., economic and cultural centre of the above, on the Dnieper. It is a major industrial centre (iron and steel, aluminium, chemicals, combine harvesters). It is also

a transportation centre (riv. port, air-port, and possesses 4 railway lines). There is a large hydro-electric station (*see* DNEPROGES). Z. was founded in 1770 as a fortress in the defence line against the Crimean Tatars. It was much fought over in 1918-19, and suffered greatly during the Second World War (occupied by Germans from 1941 to 1943). Pop. (1956) 381,000 (7th in the Ukraine; c. 1914, 51,000; 1926, 56,000; 1939, 282,000).

Zapotec, Amer.-Indian tribe who exercised supremacy in Mexico before the 16th cent. There are now rather less than 200,000 Z.s, living chiefly in Oaxaca state.

Zara, *see* ZADAR.

Zarabanda, *see* SARABAND.

Zaragoza (Eng. Saragossa): 1. Sp. prov., in Aragón (q.v.). It is, in general, an open plain, with great extremes of climate, and is watered by the Ebro (q.v.) and its tribs., the Jalón, Huerva, and Arba. In the N. and W. it is bounded by mts. Cereals, live-stock, oil, and wine are produced. Area 6,728 sq. m.; Pop. 628,650.

2. (anct **Salduba**; Rom. **Caesar-Augusta**) Sp. tn, cap. of the prov. of Z., on the Ebro. It was once a cap. of Aragón (q.v.), but it declined in importance after the union of that kingdom with Castile. In a siege by the French during the Peninsular war (q.v.) half of its inhab. *d.* In the Civil war of 1936-9 it supported the insurgents. It has 2 cathedrals, the old in Gothic style, and the new (begun 1681) a Baroque building with 10 cupolas. There are other noteworthy buildings, and a univ. (1474). Z. is a commercial and railway centre; its manufs. include machinery, glass, and porcelain. Pop. 271,100. *See* IMPERIAL CANAL of ARAGÓN.

Zarate (formerly **Uriburu**), tn of Argentina in the prov. of Buenos Aires, on the Paraná R., 56 m. by rail NNW. of the cap. It has a refrigerating plant and paper factories. Pop. 33,000.

Zarathushtra, *see* ZOROASTRIANISM.

Zaratite, or **Emerald Nickel**, basic carbonate of nickel. It occurs as emerald green, botryoidal, compact masses, in Galicia, Spain, the Shetland Is., Australasia, etc.

Zaria, dist. and tn of N. Nigeria. It is watered by the Kaduna and its tribs., and its soil is fertile. Chief products are cotton and sugar. It is crossed by the Iddo-Kano railway. Z. is a garrison tn. Pop. 54,000.

Zarudnyy, **Sergey Ivanovich** (1821-87), Russian jurist. In 1861 he became head of the law dept of the State Council, and in 1869 a senator. He played a leading part in the judicial reforms of 1864 (*see* GREAT REFORMS), which completely overhauled and modernised the Russian judicial system, introduced trial by jury, public court proceedings, independence of judges and examining magistrates, etc.

Zary (Ger. **Sorau**), tn of Poland, in Zielona Góra prov., 23 m. SW. of Zielona Góra (q.v.). It was formerly in Brandenburg (q.v.). In the Middle Ages it had a salt mkt. It went to Saxony in 1785 and to Prussia in 1815. During the Second

World War it was very severely damaged. There are lignite mines in the dist., and there are textile manufs. Pop. 10,000.

Zasion, *see* ŠABAC.

Zatec (Ger. **Saaz**), Czechoslovak tn in the region of Ústí nad Labem (q.v.), on the Ohře (q.v.). It has a large trade in hops, for which it is famous. Pop. 12,700.

Zaysan, or **Dzaisang**, lake in the East-Kazakhstan Oblast (prov.) of the Kazakh S.S.R., situated between the Tarbagatai and Altai Mts. It receives the waters of the Black Irtysh and empties itself into the Irtysh. Area about 700 sq. m.

Zea, *see* CEOS.

Zealand (Netherlands), *see* ZEELAND.

Zealand (Dan. **Sjælland**, Ger. **Seeland**), largest is. of Denmark, is bounded by the Cattegat, the Great Belt, the Sound, and the Baltic. It has a greatly indented coast, the Roskilde being the longest fjord. The surface of the is. is undulating and the soil fertile. Agriculture, dairy farming, cattle breeding, and fishing are carried on. The chief tn is Copenhagen (q.v.). Area 2709 sq. m.; pop. 1,693,450.

Zealots, **The**, or **Cananaeans**, a Jewish party implicated in 2 revolts against Rome. They were in full accord with the Pharisees in their devotion to the Law, but in politics much more intransigent and violent. From this party came Simon, one of the Twelve Apostles.

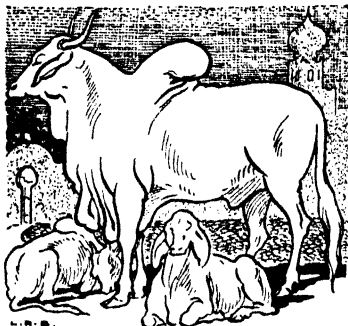
Zebdani, **Ez**, *see* EZ ZEBDANI.

Zebra, the fully striped species of the horse genus, *Equus*. There are 3 species, the largest being Grévy's Z. (*E. grevyi*), which stands some 13 hands at the withers and lives in open, scrub-covered plains in Abyssinia, Somaliland, and N. Kenya. The Mountain Z. (*E. zebra*) extends from SW. Africa into Angola, but was once common in Cape Colony. The Quagga, which form the third species (*E. quagga*), differ from the Mountain Z. in their broader hoofs, stripe pattern, and smaller ears. The S. African race is now extinct, as is Burchell's Quagga of Griqualand West. The Quagga found in E. and N. Africa, such as Grant's Quagga and Crawshaw's Quagga, are completely striped.

Zebrina, family Commelinaceae, genus of branching herbs of Mexico and S. America, akin to Tradescantia (q.v.), and often known as Wandering Jew. Z. *pendula* is most commonly grown indoors.

Zebu, or **Bos indicus**, ox which existed formerly only in a domesticated state in India. Since the 19th cent. it has been introduced into Australia, the U.S.A., etc. It is characterised chiefly by its large hump (sometimes 2), over the withers and by a greatly developed dewlap. It is high at the shoulders, narrow at the hips, with long horns, long drooping ears, and loose skin which hangs from the neck, from the low barrel chest, and from the belly. The ebony skin is thin but dense, and the short, sleek hair may be white, grey, red, or black in colour. The Z.s vary greatly in size and are used in India as beasts of burden. They have been introduced into N. Australia for the

purpose of rejuvenating the languishing cattle there. It was not until the early 1930's that systematic breeding of Z.s began.



ZEBU

Zebulun, sixth son of Jacob and Leah (Gen. xxx. 20), and the reputed ancestor of the tribe of Israel bearing his name. This tribe occupied the centre of S. Galilee. Tiglath-pileser III in 733 bc carried Z. off to Assyria (II Kings xv. 29).

Zechariah, the minor prophet, a contemporary of Haggai, c. 520 bc., cf. Ezra v. 1, and vi. 14, and Neh. xii. 16. His book is generally divided into 2 parts. The first part, chs. i-xlii, is universally regarded as the original work of Z. The second part (chs. ix-xiv), called sometimes Deutero-Zechariah, is placed by some critics in Hellenistic times, while other scholars maintain that some pre-exilic material was used. Z. gives his message largely in the form of visions. His little summary of ethical duties (viii. 16-17), and his picture of the idyllic future Jerusalem (viii. 3-6) are notable. See G. Driver (Century Bible), 1906; Barnes, 1917.

Zedekiah, name assumed as king by Mathanias, son of Josiah (597-587 bc), who succeeded Jehoiakim as a puppet of Nebuchadnezzar. He was persuaded by the pro-Egyptian party to reject the inspired advice of Jeremiah, and revolted. Nebuchadnezzar besieged Jerusalem for 2 years. It fell in June 587 and most of its inhab. were deported. Z.'s sons were killed in his presence, and his eyes then put out. He ended his days in captivity, though treated with consideration by Evil Merodach.

Zeebrugge, seaport in the prov. of W. Flanders, on the N. Sea, Belgium, 7 m. N. of Bruges, whose port it is. It has a fine breakwater, and a ship canal (7 m. long), connecting it with Bruges, which was opened in 1907.

During the First World War a Brit. naval raid was made on Z. on 23 April 1918. Its object was to block the submarine and destroyer exits (see also OSTEND). A party landed on Z. mole and destroyed its works, while a submarine

loaded with explosives was run under the viaduct and exploded. Meanwhile the blockships were sunk and the survivors of their crews were rescued by the *Vindictive* and her consorts.

Zeehan, tn of Tasmania, 90 m. ENE. of Hobart. It is the centre of a silver-mining dist. Pop. 816.

Zeeland, or **Zesland**, SW. prov. of the Netherlands. It consists of 5 is. lying in the Scheldt estuary, and the region N. of the Belgian prov. of E. Flanders. The surface is very flat and much of it is below sea-level, protected by dikes. The soil is fertile. Corn, butter, and cheese are produced, and cattle reared. Chief tns are Middelburg (cap.) and Flushing. In Feb. 1953 heavy floods caused great damage to the dikes, and 375,000 ac. of land were inundated with salt water. Reconstruction of the dikes took 9 months. Plans to build enclosing dams in the estuary of the Z. is., which will take about 25 years to be completed, are being worked out. Area 650 sq. m.; pop. (1954) 275,370.

Zeeman Effect. In 1896 the Dutch physicist and Nobel prize winner (1902) P. Zeeman (1865-1943) discovered that the lines of the spectra of atoms (see SPECTRUM) are changed when the atoms are situated in an intense magnetic field. In the simplest case each spectral line appears split into either 2 or 3 components, according as the observations are made on light emitted parallel to, or at right angles to, the lines of the magnetic field; the light is also found to be polarised. The explanation of the effect given by Lorentz, although later shown to be over-simplified, was the first clear indication that the emission of light was to be attributed to electrons within the atom. The phenomenon provides a means of demonstrating that magnetic fields exist in the sun and stars, and allows these fields to be measured.

Zeiss, Carl (1816-88), Ger. optician, b. and educ. at Weimar. He was then apprenticed to various instrument-makers in Weimar, Stuttgart, and Vienna. In 1846 he opened his own workshop at Jena. In 1866 with Ernst Abbe and Otto Schott, he worked upon the microscope, perfecting the homogeneous immersion lens in 1878. In 1889 the firm was incorporated as the Carl-Zeiss-Stiftung, and gained a world-wide reputation, embracing every kind of optical instrument.

Zeist, or **Zeyst**, tn in the prov. of Utrecht, Netherlands, 7 m. ESE. of the city of Utrecht. It is a popular summer resort. Manufs. include porcelain-stoves, candles, and soap. Z. is the Dutch centre of the Moravian Brethren (q.v.). Pop. 47,610.

Zell am Ziller, see ZILLERTAL.

Zella-Mehlis, Ger. tn in the dist. of Suhl, in the Thuringian Forest, 5 m. NNW. of Suhl (q.v.). It has engineering industries. Pop. 17,000.

Zemlya Frantsa-Iosifa (Franz-Josef Land), archipelago in the Arctic Ocean, situated about 250 m. to the E. of Spitsbergen. It is described as a lofty,

glacier-covered land reaching an elevation of 2400 ft. and is comprised of some 60 is. which are volcanic. It was discovered by Payer and Weyprecht in 1873, and was explored by Leigh Smith in 1881 and 1882. In 1894 Alfred Harnsworth (later Lord Northcliffe) fitted out an expedition under the leadership of F. G. Jackson. The party landed near Cape Flora, and spent the summer of 1895 exploring the coast to the NW. They reached Cape Richthofen in 1896, and named the expanse of water to the N. Queen Victoria Sea. In June of the same year they met Nansen on his southward journey, and lent him the *Windward* for his homeward voyage. In 1897 Capt. Robertson of Dundee made discoveries in Z. F. I., and Wyche's Land was circumnavigated by Pike and Crossley. In 1898 an expedition under Wellman landed at Cape Tgetthof and defined the E. extension of the archipelago. In 1899 the Duke of Abruzzi made his way to Crown Prince Rudolf Land and wintered in Teplitz Bay; the party reached 86° 33' N. lat., 240 m. from the Pole. In 1903 the Zeigler expedition went N. by this route. In 1928 Z. F. I. was annexed by the U.S.S.R. and it was temporarily renamed Lomonosov Land. A meteorological observation post was set up in 1929 on Hooker Is. This and 2 others, one on Rudolph Is. (estab. c. 1937), are still maintained. See F. G. Jackson, *A Thousand Days in the Arctic*, 1899.

Zemskiy Sobor ('Assembly of the Land'), in 16th-17th-cent. Muscovy, an assembly of representatives of boyars (q.v.), clergy, merchants, tns, and rural dists. for deciding on important measures of state policy. The Z. S. was first appointed, but later elected. The Z. S. of 1612 put an end to the Time of Troubles (see TROUBLES, TIME OF) and decided to meet regularly in the future; it was finally abolished by Peter the Great.

Zemstvo, local gov. body in Russia from 1864 to 1917. Dist. Z. assemblies were elected by the pop. on a restricted franchise, and in turn elected the prov. Z. assemblies. Assemblies and their executives had authority in economic and educational matters, public health, etc.; their activities were supervised by prov. governors. The Z. was the main field of practical activity for the liberal and radical intelligentsia, and the main vehicle of the constitutional movement before the revolution of 1905 (q.v.). During the First World War the Z. played an important part in the war effort and in the movement for a responsible gov. After the Feb. Revolution (q.v.) in 1917 the authority of the Z. was extended, but after the Bolshevik seizure of power (see OCTOBER REVOLUTION) Z.s were abolished altogether and replaced by the Soviets (q.v.). See P. G. Vinogradoff, *Self-Government in Russia*, 1915.

Zemun (Ger. *Semlin*; Rom. *Taurunum*), tn in Serbia, Yugoslavia, in the angle formed by the junction of the Danube and Sava. It is a NW. suburb of Belgrade, to which it is joined by bridges. It has anct

fortifications, and the remains of the castle of Janos Hunyadi (q.v.). There are textile, chemical, and aircraft manufs. Pop. 40,000.

Zenith, point where a vertical line terminates in the celestial sphere, and thus the opposite of the nadir. It is therefore an important point of reference in astronomy, Z. distance being the angular distance of an object from the Z. and the complement of altitude. The Z. telescope, superseded by the transit instrument (q.v.), was invented for measuring the difference between the Z. distances of a pair of stars, culminating near the Z. at about the same time. See ASTRONOMY.

Zeno: 1. Of Elea (early 5th cent. BC), b. Elea in S. Italy. He was the favourite disciple of Parmenides (q.v.) whom he accompanied to Athens c. 448, and whose doctrine of the One he upheld in a series of famous paradoxes, e.g. Achilles and the Tortoise. Aristotle called Z. 'the founder of dialectic.' See H. D. P. Lee, *Zeno of Elea* (with trans. of the surviving fragments), 1936.

2. Of Citium (335-263 BC), Gk philosopher, founder of the Stoic school, b. Citium in Cyprus. He attached himself to the cynic Crates, but later studied under Stilpo, Diodorus Cronus, and Philo of the Megarian school. He then proceeded to the Academics, Xenocrates and Polemo, and opened a school for himself in the 'Painted Porch,' *Stoa Poikile*. Hence his disciples were called Stoics (q.v.). See A. C. Pearson, *The Fragments of Zeno and Cleanthes*, 1891; E. Bevan, *Stoics and Sceptics*, 1913; M. Pohlenz, *Die Stoa*, 1949.

Zeno (426-491), Byzantine Emperor, 474-491, b. Isauria. He married the daughter of Leo I and became emperor on the death of his son (Leo II) by this marriage. His reign was disturbed by revolts and foreign wars, and from 475 to 476 Z. was forced into exile, Basiliscus seizing the throne in his place, but he was later reinstated. In 487 Z. persuaded Theodoric the Goth to invade Italy in order to save himself and his cap.

Zeno, St (d. 371), b. in Africa; Bishop of Verona from 362 until his death. He is chiefly remembered for his writings on the virgin-birth of our Lord. His feast is on 12 April.

Zenobia, Queen of Palmyra. After the death of her husband, Odenathus (AD 266), she became the regent for her sons and tried to assert her authority over all Syria, Asia, and Egypt. She was defeated by Aurelian in 273, taken prisoner, and carried to Rome, where she adorned her conqueror's triumph in the following year. Z.'s life was spared, and she spent the remainder of her days together with her sons near Tibur.

Zenta, see SENTA.

Zeolites, family of minerals consisting mainly of hydrous silicates of lime, soda, and alumina, which have resulted from the alteration of feldspars and feldspathoids. Being chiefly secondary products, they occur in cavities and veins, and are common in amygdaloidal basalts, where they present a finely fibrous structure. Among

the more common zeolites are analcite, natrolite, stilbite, prehnite, and laumontite. They have a specific gravity of about 2-3, and a hardness of from 3.5 to 5. Artificial minerals resembling Z. in composition are used in water-softening as, for example, in the *Permutit process*.

Zephaniah, the minor prophet, preached during the reign of Josiah (Zeph. i. 1). The 2 chief features of his prophecy are his vivid portrayal of the Lord's Day as a day of disaster (i. 14-18), and his doctrine that a righteous remnant will survive it (ii. 3-7).

Zephyrinus, St. (d. 217), Pope from 199 until his death. His feast is on 26 Aug.

Zephyrus, the W. Wind, son of Astraeus and Eos, father of the horses Xanthus and Balius by the harpy Podarge, and of Carpus by his wife, Chloris.

Zeppelin, Ferdinand, Count von (1838-1917), Ger. inventor and designer, b. Constance. He studied at the Polytechnik, Stuttgart, and at the Kriegsschule, Ludwigsburg, afterwards proceeding to Tübingen Univ. He took part in the Amer. Civil war, and also served in the Franco-Ger. War (1870), but from 1897 to 1900 was occupied in the construction of his first airship or dirigible balloon of rigid type, which made its first ascent in 1900. The Zeppelin (and other types based on its form of rigid structure) soon became successful and popular, and from it evolved the whole development of large airships (see AIRSHIP).

Zeppelins, type of rigid airship invented by Count Zeppelin (q.v.). See AIRSHIP.

Zeran, see CERAM.

Zeravshan, or Kara-Darya, riv. of the Tajik and Uzbek S.S.R.s. It rises in the Z. Mts and disappears in the wilderness near the Amu-Darya. Length 480 m.

Zermatt, vil., spa, and winter sports resort in the canton of Valais, Switzerland, at the head of the Visp Valley (5315 ft), and at the foot of the Matterhorn (q.v.), 22 m. by rail from Visp in the Rhône Valley. It is one of the chief summer and winter resorts in the Swiss Alps, having an invigorating climate and impressive scenery. Pop. 1100.

Zero (Arabic *ṣafra*, to be empty), term applied in mathematics to 0, or to quantity so small as to be negligible, and in physics to a point which serves as the base of measurements. 'Z. hr' is the starting time of any planned operation.

Zeromski, Stefan (1864-1925), Polish novelist. Of an impoverished, noble family, Z. had a difficult early life until receiving a post as librarian. Among his notable works are *Szyzifowe prace*, largely autobiographical; *Popioły* (Eng. trans. *Ashes*), a picture of Poland in the Napoleonic era; and his last work *Przedwiośnie*, 1924, criticising the Poland of the time from a left-wing point of view.

Zeta, or Zero Energy Theronuclear Assembly, a device constructed at the Atomic Energy Research Establishment, Harwell, England, for the controlled release of energy by a thermonuclear reaction (q.v.). It consists of an aluminium

toroidal chamber, with a bore of 100 cm. and mean diameter 300 cm., containing deuterium gas at very low pressures (c. 10^{-7} atmospheres). A large current (c. 200,000 amps.) is momentarily induced in the ionised gas by making the gas the single turn secondary of a transformer, and discharging up to 500,000 joules through the primary by means of a bank of condensers. The magnetic field produced by the current in the gas 'pinches' the discharge into a region near the axis



'The Times'

ZETA, SHOWING THE MASSIVE TRANSFORMER AND THE HORIZONTAL, RING-SHAPED TUBE

of the torus, and a current flowing in a coil wound on the torus produces an axial magnetic field (c. 200 Oersteds) which stabilises the discharge. Eddy currents in the aluminium torus induced by any 'wriggling' of the discharge give further stability, but insulating gaps are necessary in the torus to prevent the induction of a large current in the aluminium by the action of the primary. The combined effect of the current in the gas and the associated sudden compression produces temps. around 5,000,000° C., leading to the fusion of deuterium nuclei and the consequent emission of energy and neutrons. This was first achieved at Harwell in Aug. 1957, when the neutrons were detected and the temps. measured spectroscopically. Neutrons from non-stabilised discharges were reported by Russia in 1956. For temps. near 100,000,000° the energy produced would be roughly equal to that put in, and for higher temps.

the method should produce nuclear power on a practical and economic basis.

Scripte III, a smaller version of Zeta, was developed contemporaneously for the controlled release of energy by a thermonuclear reaction at the Associated Electrical Industries Research Laboratories at Aldermaston, near Reading, England.

See ATOM and ATOMIC THEORY; HYDROGEN BOMB; NUCLEAR POWER; NUCLEUS; THERMONUCLEAR REACTION.

Zetland, **Lawrence John Lumley Dundas**, second Marquess of (1876–), politician and writer, educ. at Harrow and Trinity College, Cambridge. From 1907 to 1916 he was Conservative M.P. for Hornsey; from 1917 to 1922 he was governor of Bengal. He succeeded to the title in 1929. From 1935 to 1940 he was secretary of state for India, and secretary for Burma, 1937–40. His publs. include official lives of Lord Curzon, 1928, and Lord Cromer, 1932, *Steps Towards Indian Home Rule*, 1935, and his memoirs pub. in 1957.

Zetland, see SHETLAND.

Zeugma (Gk *zeugnūnai*, to yoke) is a figure of speech in which 1 word is used with 2 others, to only one of which it is grammatically or logically applicable. Examples are 'With weeping eyes and hearts' (where one would expect 'bleeding hearts') or Pope's line, 'See Pan with flocks, with fruits Pomona crowned.' The term *zeugma* is often used also for the allied figure *syllipsis* (q.v.). See also FIGURE OF SPEECH.

Zeus, the greatest of the Olympian gods, was originally the chief deity of the Hellenic invaders of Greece, the personification of the bright sky, and perhaps of the same element as sender of fertilising rain. He was soon identified with the prin. ohthonian deity of pre-Hellenic Crete; and from this source, as well as from the Homeric poems, there arose a wealth of hopelessly confused legend. In classical mythology Z. was son of Cronus and Rhea; he was b. in Crete and nursed there, on Mt Dictæ, by the Curetes (q.v.). In course of time, assisted by his brothers Poseidon and Hades (qq.v.), he overthrew Cronus and assumed dominion of the world. The sisters of Z. were Demeter, Hera, and Hestia (qq.v.); and by his sev. marriages, incestuous and otherwise, he became the father of Apollo and Artemis, Ares, Athena (qq.v.), and numerous lesser gods and heroes. According to Homer, Z. dwells on Mt Olympus in Thessaly, which was believed to penetrate into heaven itself. He is called Father of gods and men, the most powerful among the immortals. He is the supreme ruler, who with his counsel manages all things; the founder of kingly power, and of law and order. He is armed with thunder and lightning, and the shaking of his aegis produces storms. The eagle, the oak, and the summits of mts were sacred to Z.; his sacrifices consisted of goats, bulls, and cows. The most splendid of all his thousands of temples was that at Olympia, which housed a chryselephantine statue of the god, made by Pheidias and reckoned among the 7

wonders of the world. See A. B. Cook, *Zeus* (3 vols.), 1914–40; W. K. C. Guthrie, *The Greeks and their Gods*, 1950; C. Seltman, *The Twelve Olympians*, 1952. See also JUPITER.

Zeuxis (fl. 425–400 BC), Gk painter, b. Heraclea. He belonged to the Ionic school of art and apparently drew his inspiration from Apollodorus. His rivalry with Parrhasius (q.v.) is the subject of anecdote. His reputed masterpiece was a picture of Helen which he painted for Crotona, combining in the figure the beauties of 5 maidens of that city. That realistic imitation was valued in his time is suggested by the well-known story of the birds pecking his painted grapes.

Zgierz, tn of Poland, in Łódź prov., on the Bzura, 7 m. NNW. of Łódź (q.v.). It has chemical and textile industries. Pop. 24,000.

Zgorzelec, tn of Poland, in Wrocław prov., on the r. b. of Lusatian Neisse (q.v.), 90 m. W. of Wrocław (q.v.). Until 1945 it was an E. suburb of Görlitz (q.v.). It has lignite mines and textile industries. Pop. 7000.

Zhdanov, Andrey Aleksandrovich (1896–1948), Russian politician. He joined the Bolsheviks in 1915, and from 1924 to 1934 was head of the party organisation (see COMMUNIST PARTY OF THE SOVIET UNION) in Nizhny Novgorod, and from 1934 (after the assassination of Kirov, q.v.) to 1944 in Leningrad; simultaneously from 1934 he was secretary of the party's Central Committee, becoming in 1935 a candidate member of the Politburo (q.v.), and in 1939 a full member. As Central Committee secretary Z. was in charge of ideological matters, and he largely shaped the ideological aspects of Stalinism (q.v.). He introduced Socialist Realism (q.v.) as obligatory, replaced Pokrovskiy's (q.v.) school of historiography by that of Grevoy (q.v.), and conducted the post-war campaigns against Western cultural influences, 'formalism' in the arts, and 'objectivism' in scholarship. During the siege of Leningrad in the Second World War Z. played an important part in the defence of the city. In 1947 he played a leading rôle in the creation of the Cominform.

Zhdanov (until 1948 Mariupol'), city in the Stalino Oblast of the Ukraine, on the N. coast of the Sea of Azov. It is a major industrial centre, with large iron and steel plants using ore from Kerch, and engineering and other industries. It is the seaport of the Donets Basin (q.v.). Pop. (1956) 273,000 (c. 1914, 45,000; 1939, 222,000), Russians and Ukrainians (before the war also Greeks). Z. was founded in 1775 by Gk colonists, and has been a seaport since 1780; its industrial development dates from the 1890's and was particularly marked during the 1930's. It suffered greatly during the Second World War (occupied by the Germans 1941–3).

Zhitomir (Ukrainian *Zhytomyr*): 1. Oblast in the Ukraine, W. of Kiev, on the Volhynia-Podolia upland in the S. and the Poles'ye lowland in the N., partly covered with pine and oak forests, and

with large deposits of materials used in building. Grain, potatoes, and sugar beet are grown, and cattle raised; there are also food, timber, and metalworking industries. The prin. tns are Z. and Herdichev. Area 11,600 sq. m.; pop. (1956) 1,587,000, mostly Ukrainians, also Russians and Jews (before the Second World War Poles and Germans).

2. Cap. and economic and cultural centre of the above, 80 m. W. of Kiev. It has woodworking and food industries, and it is a railway junction. Known since 1240, it belonged to Kiev principality, became Lithuanian in 1320, Polish in 1569, and Russian in 1793; it became prov. cap. in 1804. Bitter fighting took place there in 1943-4. Pop. (1956) under 100,000 (1891, 70,000; c. 1914, 93,000; 1926, 68,000; 1939, 95,000), before the Second World War half Jewish.

Zhmud', Zhmudes, see SAMOGITIA.

Zhukov, Georgiy Konstantinovich (1896-), Russian soldier, Marshal of the Soviet Union, the most outstanding Russian military leader of the Second World War. He was of peasant origin and joined the Red Army in 1918 and the Communist party in 1919. He first became known for his successful operations against the Japanese on the Mongolian-Manchurian frontier in 1939. During the Second World War he was at first Chief of the General Staff, then Deputy Commissar (Minister) of Defence and Deputy Supreme Commander-in-Chief of the Soviet armed forces. He took a leading part in planning the operations of the Soviet forces, often co-ordinating the actions of a number of army groups in an operation (in the defence of Moscow, 1941, the battle of Stalingrad, 1942, in relieving Leningrad in 1943, and in the advance to the W. in 1943-4), and sometimes personally taking over the command of an army group (e.g. in the final advance to Berlin). In Berlin he received the surrender of the Ger. High Command on 8 May 1945, and headed the Soviet Control Committee in Germany, 1945-6. In 1946 Stalin, resentful of Z.'s popularity, removed him from Berlin, and after a short period of service as Commander-in-Chief Land Forces and Deputy Minister of Armed Forces, Z. was sent into a kind of honourable banishment as commander of a military dist. Upon Stalin's death in 1953 he was again appointed a First Deputy Minister of Defence, and in 1955 Minister of Defence. In 1956 he became a candidate member of the praesidium (see POLTBURO) of the Communist party's Central Committee, the first professional soldier to enter this seat of real power in the country. In the internal struggle in that body he took the side of Khrushchëv against Stalin's chief lieutenants Malenkov, Kaganovich, and Molotov (qq.v.), and on their expulsion he became a full member (1957). After a few months, however, he was himself dismissed as Minister of Defence and expelled from the praesidium and the Central Committee of the party for undermining the party's political influence in the armed forces (see COMMUNIST PARTY OF THE SOVIET UNION). Afterwards his role in

the Second World War was again played down by the official propaganda. See EASTERN FRONT, or RUSSO-GERMAN CAMPAIGNS IN THE SECOND WORLD WAR.

Zhukovskiy, Vasilii Andreyevich (1783-1852), Russian poet, head of the Romantic school in Russian literature (the ballad *Svetlana*, 1811). He made excellent trans. of Schiller, Byron, Firdovsi, Homer, etc. Z. was tutor to Alexander II (q.v.) and often used his influence at the court to intercede for the opponents of the regime (e.g. Decembrists, q.v.), although he did not share their views.

Ziegfeld, Florenz (1869-1932), Amer. producer and showman, b. Chicago. In 1893 he was a showman at the Chicago World Fair. Two years later he arrived penniless in London, but succeeded in assembling another show and engaging Anna Held, the most popular showgirl of the day, whom he later married. In 1914, a year after his divorce, he married Billie Burke, the actress and film star. Z. was noted for his lavish musical productions, but more especially for his spectacular and exotic revues, the *Ziegfeld Follies*, which he staged for 24 years.

Zielona Góra: 1. Prov. (*województwo*) of W. Poland, bordering in the W. on Germany. It is generally low-lying, and is drained by the Oder, the Lusatian Neisse, and the Bobrava (qq.v.). Before 1945 its ter. was in the Ger. provs. of Brandenburg and Lower Silesia (qq.v.); the Ger. pop. was expelled after the Second World War. Live-stock is raised, and fruit and vines are grown. There are metal and glass industries. Area 5744 sq. m.; pop. 400,000.

2. (Ger. *Grünberg*) Tn of Poland, cap. of Z. prov., 230 m. W. of Warsaw (q.v.). Until 1945 it was in Lower Silesia (q.v.). It was an important commercial tn in the late Middle Ages, and has a medieval church and tn hall. It is a lignite-mining centre, and has a textile industry and a power station. Pop. 20,000.

Ziggurat, Babylonian word for the temple tower which was a characteristic architectural feature of the larger Sumerian, and later Babylonian and Assyrian cities. Z.s were constructed of baked clay bricks and bitumen mortar with 3 to 7 terraces, each of diminishing size and surmounted by a small temple which was used only on special occasions, such as the New Year Festival. Access to the various levels was by stairways, and some ruins show that trees and other plants were grown on the upper terraces and were watered by special water-raising devices (see HANGING GARDENS OF BABYLON). The best-preserved Z. is at Ur (q.v.); the remains of the lower 2 stages measure 200 ft × 150 ft × 70 ft (height). The best known is the Tower of Babel, perhaps the Etemenanki, 'Building of the Foundation of Heaven and Earth,' and its associated temple Esagila. 'Temple whose Top is Heaven.' However, the ruins of other Z.s at Borsippa (q.v.) and Aqar Quf (near Baghdad) have been associated with the story of Genesis xi. 1-9. See C. L. Woolley, *The Ziggurat and its*

Surroundings, 1938: A. Parrot, *The Tower of Babel, 1956.*

Žilina: 1. Region (*kraj*) in Central Czechoslovakia, bordering on Poland, part of the former prov. of Slovakia (q.v.). It lies in the Carpathians (q.v.), is generally mountainous, and is watered by the Váh (q.v.). Area 3192 sq. m.; pop. 509,500.

2. (Ger. *Sillein*; Magyar *Zsolna*) Czechoslovak tn. cap of the region of Z., on the Váh. It is a road and railway junction, and has textile and paper manufs. Pop. 16,000.

Zillertal, valley of the Ziller, a trib. of the Inn, in the Austrian Alps. Its life centres round the vil. of Zell am Ziller, and it has numerous tourist resorts.

Zilliacus, Konrad Viktor (Konni) (1855–1924), Finnish author and politician; one of the leaders of the patriotic resistance movement against Tsarist Russian oppression at the turn of the cent. He had 2 sons, **Konni Z.** (1894–), Brit. author and politician, M.P. (Labour); and **Laurin Z.** (1895–), Finnish pedagogue, head of the 'New Education Fellowship' branch for Finland.

Zimbabwe, site of amazing ruins in S. Rhodesia, 17 m. SE. of Fort Victoria, 120 m. E. of Sofala. They present the general appearance of a fortress. It is thought that they may have been erected by Arabs in search of gold in the area. Other archaeologists have suggested that the ruins are of Indian origin, and another school believes that they are a Bantu masterpiece, representative of the flowering of the Bantu culture in the Middle Ages. In the ruins porcelain of the Ming period has been found and also a large quantity of golden ornaments, most of which have been 'lost.' Z. is said to have inspired Rider Haggard to some degree. In Chicago in 1952 and in London in 1954 wooden lintels removed from the ruins were tested by the radio-carbon process. By process of deduction it now seems certain that these tests have estab. the probable age of the Z. ruins as about 1200 years.

Zimme, see CHIENG-MAI.

Zimmermann, Johann Georg (1728–95), Swiss author and philosopher, b. Brugg. He was the author of *Über die Einsamkeit*, 1756–85, and *Vom Nationalstolz*, 1758, which count among the best Ger. prose works written in the 18th cent. He was also a famous physician, and in 1763 wrote his useful treatise *Von der Erfahrung in der Arznei*.

Zinc, symbol Zn, atomic number 30, atomic weight 65.38, metallic element generally met with in combinations as the carbonate (calamine), ZnCO_3 , and the sulphide (Z. blende), ZnS . It also occurs as silicate (hemimorphite), $\text{ZnSiO}_3 + \text{H}_2\text{O}$, and as red Z. ore, ZnO . Silver, lead, and Z. are often found together in the same mineral vein, or in the same locality, notable instances being Broken Hill in New S. Wales and Mt Isa in Queensland, both rich Z. areas. Mexico is a large Z. producer; the U.S.A. produces 30 per cent of the world's Z. There are also large reserves of Z. in Canada and Russia, and deposits in Germany, France,

Sweden, etc. The extraction of the metal from its ores is carried out in 2 stages, the oxide being first formed, and in the second stage this is reduced by carbon. Blende is the ore generally employed, and this is converted to oxide by roasting in air. The crude oxide is mixed with coal or coke and strongly heated by gas-fired furnaces, in clay retorts or muffles, and the Z. vapour condensed in an iron box



National Film Board, Canada

ZINC MINING AT FLIN FLON, MANITOBA

Miners steadying the 'Stoper' gun in the mine, which yields zinc, copper, gold, silver, cadmium, and selenium.

(Silesian process). In the Belgian process the mixture is heated in a horizontal fire-clay tube connected by a conical clay tube to a sheet-iron condenser. The crude Z. is melted in a reverberatory furnace and further purified by distillation. Process methods no longer employed are the Eng. method and the Carinthian method. In extraction older intermittent furnaces are being rapidly superseded by continuous vertical retort furnaces. Wet methods of extraction are by electrolytic processes, and by electric reduction furnaces. The latter method is increasingly used in Sweden, the U.S.A., and the Soviet Union, where there are large reserves of hydro-electric power. Z. is a bluish-white brittle metal (sp. gr. 7, melting-point 420°C , boiling-point 907°C) which is malleable between 100° and 150°C . It is permanent in dry air at ordinary temp., and is used for galvanizing iron for roofing purposes, etc. A number of alloys are formed by Z. with other metals, e.g. brass (copper and zinc), bronze (copper, tin, and zinc), etc. Z. burns in air, forming the oxide, ZnO (Z. white). The oxide is white at ordinary temp., but becomes yellow on heating.

It is a basic oxide, and the salts of the metal can be prepared from its solution in acids. Z. sulphate (white vitriol) is obtained by dissolving the metal, its oxide or carbonate in sulphuric acid, or is made on a large scale by roasting Z. blende in air. The sulphate crystallises from water, forming colourless rhombic prisms of the formula $ZnSO_4 \cdot 7H_2O$ isomorphous with magnesium sulphate (Epsom Salts). It has a metallic astringent taste, is poisonous, and is used as an emetic, in the dye industry as a mordant, and in the manuf. of varnishes. Z. chloride is formed by dissolving the metal or oxide in hydrochloric acid, and boiling the solution down until it solidifies on cooling. It is a white, deliquescent substance, and made into a paste with Z. oxide rapidly sets to a hard mass. This mixture is used in dentistry as a filling. A solution of the chloride is used as a flux in soldering.

Zinc, Extraction of, see **METALLURGY**.

Zinc Sulphate, see **ZINC**.

Zincography, see **PROCESS WORK**.

Zinder, tn of Niger Colony, in the Fr. Sudan, W. Africa, 350 m. from Timbuktu. There is trade in salt, spices, etc., and telegraphic communication with Kayes and Niamey. It is a walled city, and is a centre for trade across the Sahara to Tripoli. Pop. 8000 (estimated).

Zingiber, see **GINGER**.

Zinke, see **CORNETT**.

Zinnia, genus of garden-flowers of the family **Compositae**. *Z. elegans*, from which most of the varieties are derived, is an annual and was introduced from Mexico in 1796.

Zinoviev, see **ZINOV'YEV**.

Zinovievsk, or **Zinov'yevsk**, see **KIROVOGRAD**.

Zinov'yev (real name Radomyslskiy), Grigoriy Yevseyevich (1883-1936), Russian politician of Jewish origin. He joined the Russian Social Democratic Labour party (q.v.) in 1901, the Bolshevik faction in 1903, and was a member of the party's Central Committee from 1907; he emigrated after the revolution of 1905 (q.v.), and from 1909 to 1917 was Lenin's closest collaborator in running the Bolshevik organisation and in factional strife. After the Feb. Revolution (q.v.) in 1917 he returned with Lenin to Russia. He joined with Kamenev (q.v.) in opposing Lenin's policy of seizure of power by the Bolsheviks. After the Oct. Revolution (q.v.) he was chairman of the Leningrad Soviet (see **SOVIETS**), and in 1919 became a candidate member of the Politburo (q.v.), a full member in 1926, and from 1919 to 1926 was chairman of the executive committee of the Communist International. In 1924 a letter purporting to come from Z., inciting rebellion, was pub. in the London press and possibly helped to defeat the Labour Gov. In the inner-party struggle after Lenin's death, Z. first associated with Kamenev and Stalin against Trotsky, but after the latter's defeat sided with him and Kamenev against Stalin (see **LEFT OPPOSITION**). Defeated by the opposition of Stalin and Bukharin (q.v.), Z. lost all his high offices and was sev. times expelled from the

party. In 1935 he was sentenced to 10 years' imprisonment for 'moral complicity' in the murder of Kirov (q.v.), was retried in 1936 at the first of the big show trials of the Great Purge (q.v.), and executed.

Zinzendorf und Pottendorf, Nikolaus Ludwig, Count von (1700-60), Ger.-Moravian theologian, b. Dresden. He left the Saxon state Church and founded the pietistic colony of Herrnhut for the Moravian Brethren in 1722. Banished from Saxony in 1736, Z. travelled extensively in Europe and America on behalf of the Moravian Church. See life by H. Renkewitz, 1935.

Zionism, or **Zionist Movement**, movement for the re-estab. of Jewish national life in Palestine (q.v.). It is the modern expression in organised form of the Jewish traditional love for Zion, and of the hope in the ultimate ingathering of Israel from the *Diaspora*. Various proposals for the resettlement of the Jews in their ancestral home were made from the end of the 17th cent. Theodor Herzl (1860-1904), a Viennese journalist and playwright, pub. a pamphlet, *The Jewish State*, 1896, in which he advocated the creation of an autonomous Jewish settlement as the solution of the Jewish question, and in 1897 convened a Congress in Basel to consider his project. This Congress, attended by over 200 delegates from all parts of the world, adopted, as the programme of the movement, 'The aim of Z. is to create for the Jewish people a Home in Palestine secured by public law.' The Congress founded a world-wide organisation, with H.Q. in Vienna, consisting of federations with local societies. After the death of Herzl in 1904 the H.Q. of the movement were transferred to Cologne, under the presidency of David Wolffsohn (1856-1914).

In 1908 the Zionist Organisation began practical work in Palestine by establishing an office in Jaffa and a Land Development Company, and engaged in urb. and agric. colonisation, as well as in educational activity. Progress was slow owing to limited resources. The organisation was maintained by means of the 'Shekel,' the ann. contribution which was paid by all members, and which entitled them to take part in the elections to the Zionist Congress. The Congress, the supreme organ of the movement, was held, after 1900, every 2 years. The Jewish National Fund was estab. in 1901 for the purchase of land in Palestine as the inalienable possession of the Jewish people. This Fund was raised entirely by voluntary contributions from Jews throughout the globe, and still exists. In 1911 the H.Q. were moved to Berlin where they remained until the First World War. The Zionist movement was divided in its attitude towards the belligerents, but eventually followed the lead of Dr Chaim Weizmann (q.v.) and Nahum Sokolow, who set up their H.Q. in London and pinned their hopes on the Allied cause. Jewish units were formed, and fought in Gallipoli and Palestine. On 2 Nov. 1917 the Brit. Gov. announced its sympathy with the

cause of Z. in the form of a letter from A. J. Balfour, then Foreign Secretary, to Lord Rothschild, as 'a declaration of sympathy with Jewish Zionist aspirations.' This became known as the Balfour Declaration. The substantive part stated that: 'H.M. Government view with favour the establishment of a national home for the Jewish people, and will use their best endeavours to facilitate the achievement of this object, it being clearly understood that nothing shall be done which may prejudice the civil and religious rights of existing non-Jewish communities in Palestine, or the rights and political status enjoyed by Jews in any other country.' The Balfour Declaration was incorporated in the preamble of the Palestine Mandate committed to Great Britain by the League of Nations in 1922. It would thus seem that Z. had achieved its primary object.

Z. now entered a troubled, if constructive, phase down to the creation of the state of Israel in 1948. It is doubtful whether it commanded the allegiance of the majority of Jews, at any rate up to the rise of Hitler in 1933. Such diverse elements as the extremely Orthodox, the Reform and Liberal Jews, as well as the Socialist *Bund* in Poland concurred in condemning Z. The movement itself was split into political and religious factions, and there were some secessions. The leadership of Dr Weizmann was frequently challenged, and in 1946 he was finally forced to make way for the more activist policy of D. Ben Gurion (q.v.), the future Prime Minister of Israel. Relations with the Brit. Gov. became progressively worse. The latter was forced somehow to reconcile the Balfour Declaration with its own commitments to Arab Nationalism. The local administration in Palestine, in its endeavours to safeguard Arab interests, was regarded with suspicion by the Zionists.

Despite these adverse influences, Z. grew in strength. Its financial organisation, the *Keren Hayesod*, played a valuable part in settling Jewish immigrants and in building towns and vills. The estab. of the Heb. Univ. of Jerusalem was a notable achievement. Until 1929, the Zionist Organisation was the Jewish Agency for Palestine recognised by the Mandate, but in that year non-Zionist elements were added to the Jewish Agency. After the estab. of Israel in 1948 the Zionist Organisation abandoned political activity, although the old parties have retained their independence. Its main work is now confined to the raising of funds for settling immigrants in Israel and general cultural activities. See N. Sokolow, *History of Zionism*, 1919; A. Bein, *Theodor Herzl*, 1944; I. Cohen, *The Zionist Movement*, 1945, and *A Short History of Zionism*, 1951; C. Weizmann, *Trial and Error*, 1949; P. Goodman, *Zionism in England*, 1949; O. K. Rabinowicz, *Fifty Years of Zionism*, 1952.

Zips, see *SPIS*.

Zircon, mineral composition silicate of zirconium, $ZrSiO_4$, found in Ceylon, the Urals, and Indo-China. It forms tetra-

gonal crystals, colourless to yellow, also green and red (hardness 7.5 sp. gr. 4.7). The yellow Z.s of Ceylon are termed 'jargoons' (q.v.), and the red-brown varieties are called 'hyacinths' (q.v.). Z. has high colour dispersion and displays fire.

Zirconium, symbol Zr, atomic number 41, atomic weight 91.22, metallic element which occurs in nature as the silicate (zircon) and as the oxide (Baddeleyite). It has been obtained in 2 forms, crystalline and amorphous, the former variety requiring a high temp. for its combustion, while the latter burns when gently heated in air. The metal is obtained by heating the fluoropotassium compound with aluminium or sodium. The metal melts at about 1700° C. It resembles silicon chemically. The normal salts are prepared from the feebly basic tetravalent hydroxide $Zr(OH)_4$.

Zita, St (1218-1278), b. Monsagrati, near Lucca. From the age of 12 until her death she was a maid-servant to a Lucca family, being noted for her charity to the poor. She was canonised in 1696, and is venerated as the patron of domestic servants. Her feast is on 27 April.

Zither (Ger. from Gk *kithara*), stringed instrument of the dulcimer type, although etymologically connected with the cittern, which it does not resemble. It has many strings (27-40) stretched over a flat sound-box, and is played with the tips of the finger, the bass strings alone being struck with a plectrum fixed to the thumb by a ring. The music played on it, mainly in the mt regions of Austria and Bavaria, is usually akin to types of folk-song and dance. It has a place in many small bands in cafés and inns in Germany and Austria, chiefly in the mt dists.

Zittau, Ger. tn in the dist. of Dresden, near the Polish and Czechoslovak borders, 48 m. ESE. of Dresden (q.v.). It has textile and engineering industries. Pop. 40,000.

Ziusudra, or *Xisuthros*, Babylonian hero of the Flood (cf. Noah), according to Berœus, who makes him the tenth King of Babylon, afterwards deified. There were many versions of the epic in which the legend was handed down; in the eleventh tablet of the Gilgamesh Epic the hero's name is Utanapishtim. See *under FLOOD*. See also R. Campbell Thompson, *The Epic of Gilgamesh*, 1928.

Zizania, a genus of 3 species of water-grasses, family Gramineae, of which *Z. aquatica*, an ann. of N. America, yields grain used as food by Indian tribes, and is sometimes sown in ponds and lakes in Britain for ornamental purposes and to provide food for water-fowl.

Žižka, Jan (c. 1360-1424), Bohemian military commander and a Hussite leader, b. Trocnov, Bohemia. He is said to have been a page in the retinue of Wenceslaus IV of Bohemia, and was certainly connected with the royal household. He became a leader of that section of the Hussites known as the Taborites about 1420 (see *HUSITES, WAR OF*). He was a superb tactician, and won a number of victories for his party before his death

from plague while commanding a combined Hussite force against Moravia.

Zlatoust, tn in the Chelyabinsk Oblast, 60 m. W. of Chelyabinsk. It is an important industrial centre of the Urals (special steels, tools, precision instruments, agric. machinery). There is a notable metal-engraving craft. Pop. (1956) 143,000 (1926, 48,000; 1939, 99,000). Z. was founded in 1754 as ironworks; it was a centre of side-arms production by 1811. Workers overthrew Bolsheviks here in 1918, and started the shock-workers' movement (q.v.) in 1927.

Zlin, see GOTTWALDOV.

Znaim, see ZNOJMO.

Znojmo (Ger. *Znaim*), Czechoslovak tn in the region of Brno (q.v.). Napoleon signed an armistice here with the Archduke Charles after the battle of Wagram (q.v.). There are pottery and food-processing industries. Pop. 19,700.

Zodiac, belt of the celestial sphere 16° wide, extending for 8° on each side of the ecliptic. Its antiquity is very great, and the region was noted by different peoples independently, a fact explained by its containing all the known planets as well as the sun and moon, and many stars grouped into constellations. It got its name 'zodiac' because many of these constellations were named after animals (Gk *zōdion*, sculptured figure (of an animal), from *zōon*, animal). The division into 12 signs, each extending over 30°, served to mark divisions of the year, each being marked by the entry of the sun, in its westward course, into a group of stars. The names have a seasonal significance intermingled with myth, and differ with the Chinese, Hindu, Chaldean, Egyptian, Greek, and Aztec. As the sun in spring crosses the equator, moving northwards, it travels through Aries, ♈; Taurus, ♉; and Gemini, ♊, respectively; at the summer solstice it is in Cancer, ♋, then commences its descent through Leo, ♌, and Virgo, ♍, these 3 marking the summer; Libra, ♎, Scorpio, ♏, Sagittarius, ♐, are then passed through in autumn, the first of these about 23 Sept.; Capricornus, ♐, is occupied at the beginning of winter, Aquarius, ♒, and Pisces, ♓, 23 Dec., being traversed in the first part of the sun's ascent N. of the equator. The 'ascending' signs are thus those of winter and spring, the 'descending' those of summer and autumn. The tropics of Cancer (q.v.) and Capricorn (q.v.) are the 2 small circles 23° 27' N. and S. of the equator respectively. The signs do not now agree with the constellations bearing their names owing to precession (q.v.). Aries is in Pisces, and so on, the signs 'backing' into constellations to the W.

Zodiacal Light, faint haze of light extending from the sun along the ecliptic, visible just after sunset or before sunrise as a cone extending above the sun's place into the sky. The best time to observe the Z. L. in the evening is about the month of Mar., when it may be seen after sunset in the W.; or in the morning about Sept., before sunrise, in the E. This is because at these times the ecliptic

attains its maximum inclination to the horizon. As the ecliptic is inclined at a large angle to the horizon within the tropics, it is best seen within those regions, when it can be observed under favourable conditions right across the sky. Here the counter-glow or *Gegenschein*, a bright patch of a few degrees in diameter, is seen exactly opposite the sun. The brightness of the Z. L. is sometimes quite conspicuous, though less so than the Milky Way. V. M. Slipher has found that the spectrum of the Z. L. is both reflected sunlight and also partly bright lines and bands, amongst which are the bright auroral lines in the yellow, due to tenuous gases. At the horizon it is 20°–30° broad, and it extends to within about 10° of the zenith. It is most generally supposed to be due to sunlight reflected from clouds of meteoric bodies or very tenuous gaseous molecules extending in a flat disc round the sun to the plane of the solar equator, and beyond the earth's orbit.

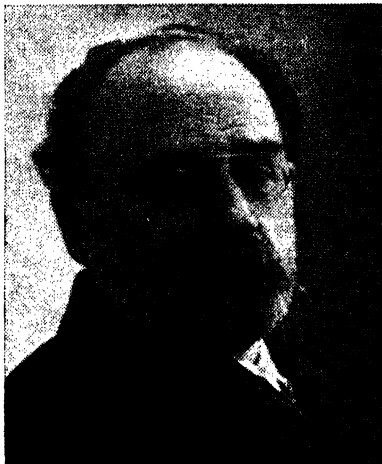
Zetrotrope, see CINEMATOGRAPH.

Zoffany (or *Zoffani*), Johann (1733–1810), Ger. artist, b. Ratisbon. He studied in Rome, and settled in England (1758), and became an R.A. (1768). His works include portraits of Garrick and other famous contemporaries. He lived and painted in India between c. 1781 and 1788. He was particularly adept at conversation pieces, some of the best examples being in the Royal collections and at the Garrick Club, London.

Zog, see ALBANIA.

Zola, *Emile Edouard Charles Antoine* (1840–1902). Fr. novelist and journalist, b. Paris. His father, an engineer, was of mixed It. and Gk descent. With the financial help of relatives, Z. was educ. at Aix, the Lycée Saint Louis, Paris, and Marseilles Univ. One of his school friends was Cézanne (q.v.). Later, after living in poverty as a journalist, he worked as a clerk in the publishing house of Hachette; while there he made the acquaintance of Taine, Sainte-Beuve, and Michelet, and became a naturalised Frenchman. He also wrote literary and art criticisms for the *Événement*, as spokesman of the Impressionists, and in 1864 he published his charming if ineffective *Contes à Ninon* and, the next year, *Confession de Claude*, which was reported to the public prosecutor as a dangerous book. He made his name with *Thérèse Raquin*, 1867, a grim, powerful story of remorse. Having thus discovered his real talent, he planned the *Rougon-Macquart*, the story of a family during the decadence of the Second Empire, the 20 vols. appearing steadily over a period of a quarter of a cent. He had the artist's imagination, a unique genius for description, and the power of giving an impressive life to a crowd, a store, a market, or a mine: these collective beings are often more living than the individual characters. In the novels of the *Rougon-Macquart* series Z. proved himself, as an exponent of realism, the master of his age. *L'Assommoir*, 1878, in which he graphically describes the results of drink upon the fortunes of a working-class family, is an example of this type of Z.'s writing, in

the brutality and coarseness of style and language. In many of Z.'s novels the sense of impending doom is all-pervasive: a notable example is *La Débâcle*, 1892, a novel of the Franco-Prussian war. Some of his works subordinate characterisation, and even the story, to the inculcation of the Socialist philosophy, which was Z.'s personal solution to the material, and, to some degree, the spiritual, problems of his age. His *Les Quatre Évangiles*, 1899-1903, exemplify this aspect of his work. (*Justice*, the fourth book, was left unpublished.) Z.



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ÉMILE ZOLA

earned the gratitude of all opponents of anti-Semitism by his challenge to the Fr. Gov. to give Dreyfus (q.v.) a hearing. This appeared in *L'Aurore* in the form of the celebrated manifesto *J'accuse*. It resulted in Z. fleeing to England, but after Dreyfus's vindication he returned to France, a popular hero (1899). In 1908 his body was removed to the Pantheon. His *Oeuvres complètes* were ed. by M. Le Blanc in 50 vols., 1927-9. See lives and studies by G. de Maupassant, 1898; A. E. Vizetelly, 1904; M. Josephson, 1929; H. Barbusse, 1932; P. W. J. Hemmings, 1953.

Zollverein, literally customs union (Ger. *Zoll*, customs; *Verein*, union). The word is especially applied to the Prussian or Ger. customs union, founded through the efforts of the gov. of Prussia in 1833 from an amalgamation of smaller Z.s, and resulting in a considerable increase in Prussian influence in Germany.

Zomba, tn, Nyasaland Protectorate, of which it is the cap. Situated on lower slopes of Z. mt, 2,900 ft., 42 m. from Blantyre. Pop. (Europeans) 500; (Asiatics) 400; (Africans) 5000.

Zone, geometrically, the portion of the surface of a sphere intercepted between 2 parallel planes. The earth's climatic Z.s are determined by planes at the Arctic and Antarctic circles, and the tropics of Cancer and Capricorn (q.v.). The resulting Z.s are known as the frigid, consisting of the polar caps; the torrid, between the tropics; the temperate, between the tropics and the frigid. They mark out the incidence of the sun's radiation, and are useful as determining that factor, rather than as giving any clue to actual climate. Actual thermometric observations have led to the establishment of *thermal zones* between certain isotherms. The equatorial or tropical regions are marked by climate and vegetation arranged in *vertical zones* between different heights above sea-level. In astronomy many star-catalogues of stellar positions are based on Z.s; thus Bessel's catalogue of 64,000 stars covers from dec. -15° to +45°; Argelander's, of 40,000, from -37° to +80°; Gould's, of 73,160, from -23° to -80°; and so on for many others. *The International Astrographic Catalogue*, the *Cape Photographic Durchmusterung*, and Argelander's catalogue are arranged in Z.s of 1°.

Zone Times, see under TIME AND TIME MEASUREMENT.

Zonguldak, important coal-shipping port of Turkey on the Black Sea, and cap. of the il of the same name. It is a centre of the coal-mining industry acquired by the Turkish Gov. in 1936. Pop. (1950) (il) 492,400; (tn) 35,630.

Zoning, a term in town and country planning (q.v.) for the definition of areas in plans for particular uses or limits of use. These may be *Character Zones* (e.g. for residence, industry (heavy, light, or 'noxious'), commerce, public buildings, open space, agriculture, etc.); *Density Zones* (limiting or prescribing numbers of dwellings, rooms, or persons an acre, or ratios of floor-space to land area built on); or *Height Zones*. Zones are often shown as primarily for one use, with other uses by special consent. Within any zone, future building or rebuilding must normally comply with the prescribed use, density, or height.

Zoo-geography, see GEOGRAPHICAL DISTRIBUTION.

Zoological Gardens, park in which wild animals are kept in captivity, for the purpose of zoological study and for public exhibition. Z. G. have existed at least since the 4th cent. BC: sev. Egyptian rulers kept their own Z. G. In England Henry I estab. a menagerie at Woodstock. This was moved to the Tower of London about 50 years later, remaining there until 1834. The Zoological Society (q.v.) opened its Z. G. in Regent's Park in 1828. These Z. G. are now world-famous: they contain sev. hundred animals, reptiles, and birds of all kinds, and cover over 34 ac. In 1927 the London Zoological Society acquired 500 ac. at Whipsnade, which was opened as a 'natural zoo' in 1931. There is a small zoo of the Whipsnade type at Chessington, and there are fine zoos at Edinburgh and Bristol.

Famous foreign Z. G. include the Jardin des Plantes, Paris, and the Berlin Z. G.

Zoological Society, in England, society for the promotion of the study of animal life (q.v.) founded in 1826. It received a royal charter in 1829. Its Zoological Gardens (the Zoo), comprising over 34 ac. in Regent's Park, London, were opened in 1828.

Zoology, branch of biology concerned with the study of animals and subdivided into many divisions, such as embryology (q.v.), histology (q.v.), anatomy (q.v.), and morphology (q.v.), which last deals with the form of the animal as a whole. The study of form is correlated with that of the functions of the parts, that is, with physiology (q.v.), a very extensive field intimately connected with bio-chemistry (q.v.), nutrition, metabolism (q.v.), locomotion, irritability, growth (q.v.), and reproduction. These studies, combined with those of geographical distribution (q.v.) and of ecology (q.v.), lead to an appreciation of the relation of the animal to its environment. In addition to distribution with regard to latitude and longitude, distribution above or below sea-level must be considered (see MARINE BIOLOGY and PLANKTON).

Comparison of animals of the same species shows that there is a variation which is probably due either to heredity (q.v.) or to the influence of environment (see EUGENICS; EVOLUTION; LAMARCKISM; MENDEL, J. G.). Fossilised remains of animals show that evolutionary changes have occurred through long periods of time, and palaeontology yields some elucidation of problems arising in the study of recent species. (See FOSSIL; PALAEONTOLOGY.) Animals are classified in 2 main groups, the Vertebrates (q.v.) and the Invertebrates (q.v.). The Invertebrates are divided into numerous phyla, which are again subdivided; the Vertebrates constitute the bulk of the phylum Chordata. The chief phyla are: (1) Protozoa (q.v., also PARASITOLOGY; TROPICAL MEDICINE), unicellular organisms (all other phyla are Metazoa, multicellular animals); (2) Porifera (Sponges, q.v.); (3) Coelenterata (including corals, jelly-fish, sea anemones, q.v.); (4) Platyhelminthes, the flat-worms (see under CESTODA); (5) Nematelminthes, the threadworms (NEMATODES, q.v., also ANKYLOSTOMIASIS; BILHARZIASIS; FILARIASIS; TROPICAL MEDICINE), and hook-worms (Acanthocephala). These are now usually divided into 3 separate phyla; (6) Trochelminthes, including the rotifers; (7) Mollusca, now usually divided into Phoronida (see PHORONS), Polyzoa (q.v.), and Brachiopoda (q.v.); (8) Echinodermata (q.v.); (9) Annelida or Annulata (see EARTHWORMS); (10) Arthropoda, including the classes Crustacea (q.v.), Onychophora (q.v.), Myriapoda (q.v.), Insecta (see ENTOMOLOGY; INSECT; INSECT BITES AND STINGS; LOCUST; MOSQUITOES; PARASITOLOGY; SAND-FLY FEVER), and Arachnida, the spiders (q.v.); (11) Mollusca (see MOLLUSCS), including the snails, mussels, oyster, octopus; (12) Chordata, animals with a notochord that may per-

sist throughout life or be replaced by a vertebral column. There are 4 subphyla, the Hemichordata, including Balanoglossus (q.v.), the Urochordata, the Cephalochordata (see AMPHIOXUS), and the Vertebrata or Craniata, including the Cyclostomata, Pisces, Amphibia, Reptilia, Aves (see BIRD), and Mammalia (see MAMMALS). See also separate headings. See *The Cambridge Natural History*, 1895-1909; G. R. De Beer, *Vertebrate Zoology*, 1928; Sir A. E. Shipley and E. W. Macbride, *Zoology* (4th ed.), 1920; C. Singer, *A Short History of Biology*, 1931; Sir J. A. Thomson, *Biology for Everyman*, 1934; and *Outlines of Zoology* (9th ed.), 1944; L. A. Borradaile and F. A. Potts, *The Invertebrata* (2nd ed.), 1935; R. Buchsbaum, *Animals without Backbones*, 1938; A. J. Grove and G. E. Newell, *Animal Biology* (2nd ed.), 1944; P. Grassé, *Traité de zoologie*, 1948 onwards; J. Z. Young, *The Life of Vertebrates*, 1950.

Zor-kul, see VICTORIA, LAKE.

Zoroastrianism, the ancient Iranian religion as reformed by Zoroaster (Zarathushtra) probably c. 800 BC. Probably a Magian, Zoroaster tried to win his countrymen from the nomadic to a settled life of husbandry, and at the same time to purge the old Aryan religion of its polytheism. He preached an intensely ethical Dualism that was virtually monotheistic, since the victory of the Good Spirit, Ahura Mazda (see ORMAZI), over his rival, the spirit of Evil (see AHRIMAN), was assured. He reduced the nature gods of the old pantheon, the *Daetas*, to a subordinate place as the servants of Ahriman, while Mazda was attended by the 7 *Ameshaspendas*, or Amshaspendas, sometimes compared to archangels, or personified divine attributes. In the ant *Gathas* among the sacred writings of Z. (see AVESTA) we possess ant verse prophecies probably composed by Zoroaster himself, which have been compared to those of the Heb. prophets, whom in some ways he strongly resembles. He taught a lofty morality, inculcating active charity, especially to the poor, kindness to animals, truthfulness and purity, and the need for man to join with Mazda in his battle against the lying spirit of evil and all his manifestations, if man was to attain immortality and eternal happiness. After death the soul passed over the bridge of judgment, from which the wicked fell to punishment, to be destroyed with all the evil in the final conflagration that would renew the universe. He used parables in his preaching, representing the good as cattle. He was killed by hostile Magi who attacked him as he stood by an altar; but Z. became the national religion of Persia, and remained so until it was driven out (to India, where it survives in Bombay as the religion of the Parsees, q.v.) by the Muslim invaders of the 7th cent. After his day many of the old beliefs returned and were amalgamated with his teaching. The central feature of the Z. ritual was fire-worship, fire being regarded as representing the divine essence and the

source of life. Other lesser deities (the *Mazdas*) were worshipped with Mazda, including Anahita (q.v.) and Mithras, the 'eye of Mazda' associated with the sun, as the god of light (see MITHRAISM), to whom the finest hymn in the Avesta is addressed. See M. N. Dhalla, *Zoroastrian Civilization*, 1922; J. H. Moulton, *Early Zoroastrianism*, 1927; C. Gore, *The Philosophy of the Good Life*, 1930 (in Everyman's Library); A. V. W. Jackson, *Zoroastrian Studies*, 1928; J. D. C. PARRY, *Zoroastrian Doctrine of Future Life*, 1929; A. S. Wadia, *The Message of Zoroaster*, 1938.

Zorrilla y Moral, José (1817-93), Sp. poet and dramatist, b. Valladolid. He studied law at Toledo and Madrid, but soon devoted himself to literature. He is one of the chief exponents of romanticism in the 19th cent., and his work excels in colourful description and exotic atmosphere. He is at his best in his lyrical narrative *Leyendas*. His works include *Cantos del Trovador*, 1841, *Granada* (an incomplete epic), 1852, *El Zapatero y el Rey* (a comedy), 1840, and *Leyenda del Cid*, 1882. Many of his poems have been trans. into English. See N. A. Cortés, *Zorrilla, su vida y sus obras*, 1943.

Zosimus, Saint Pope (417-18), of Gk birth. His pontificate was notable for the condemnation of Pelagianism.

Zouaves, body of infantry troops in the Fr. Army, so called from the Kabyle (Algeria) tribe of Zwawa, from whom Gen. Clausel formed a regiment in 1831. These native troops were at first officered by Frenchmen, and a certain number of Frenchmen were included in the ranks; but this proved unsatisfactory, and the native element gradually died out. The Z. are among the most carefully chosen troops in the Fr. Army. The picturesque Moorish dress is still maintained. The Z. fought in N. Africa under Leclerc in the Second World War.

Zrenjanin (formerly Petrovgrad; earlier Veliki Beckerek), tn in Serbia, Yugoslavia, in the autonomous prov. of Vojvodina (q.v.). It is on the Begej, a riv. port and a railway junction, and has chemical, foodstuff, soap, leather, and mechanical manufs. Pop. 44,200.

Zsigmondy, Richard (1865-1929), Austrian chemist, b. Vienna. He held various lectureships and became prof. of colloid chemistry at Göttingen Univ. in 1907. Z. discovered methods for making colloid-chemical solutions, and constructed the first star dialyser. He was awarded the Nobel prize for chemistry in 1925.

Zsolna, see ZILINA.

Zucaro (Zucchero) **Federigo** (1542-1609), It. painter, b. Sant' Angelo; brother and pupil of the artist Taddeo Z. (1529-66). He painted huge frescoes in the cathedral at Florence, and worked in Rome for Gregory XIII. In 1574 he visited England for a short time and had success as a portrait painter. A portrait of Queen Elizabeth (Hampton Court) is doubtfully ascribed to him. He also worked in Spain for Philip II.

Zuckmayer, Carl (1896-), Ger. playwright and poet, b. Nackenheim on the

Rhine. After being for some years reader for the Reinhardt theatres, he wrote his first successful comedy *Der fröhliche Weinberg*, 1925. Other well-known plays, many of which have been filmed, include *Der Hauptmann von Köpenick*, 1931, *Des Teufels General*, 1946, and *Das kalte Licht*, 1955, a topical play about the loyalties of a Ger.-Brit. atomic-physicist. His prose works (*Der Bauer aus dem Taunus*, 1929, and *Herr über Leben und Tod*, 1938), as well as his verse, never gained the success of his plays. Z. emigrated to America in 1938.

Zug: 1. Canton of Central Switzerland. It is the smallest of the cantons, having an area of 93 sq. m. Z. joined the Swiss Confederation in 1552. The S. and SE. parts are mountainous, the highest peak being the Kaiserstock. The rest is in the basin of the Reuss, and possessing suitable grazing and pasture produces butter, cheese, etc. Much fruit is also grown, and there are distilleries. Lake Z., with an area of 21 sq. m., lies partly in Z. canton, and partly in Schwyz. Pop. (1955) 45,700. Ger.-speaking.

2. Cap. of the above canton, a picturesque little tn at the NE. corner of Lake Z., and at the foot of the Zugerberg (3255 ft). There are fine examples of 15th-cent. baroque architecture. Small as Z. is, it has some important factories manufacturing electrical equipment, metal work, and textiles. Pop. 16,700.

Zuider, or Zuider, Zee (Southern Sea), formerly an arm of the N. Sea, penetrating into the NW. Netherlands. It has now been largely reclaimed. Its area up to 1923 was 2027 sq. m. It then consisted of an oval inner part and a horn-shaped outer part, joined by a strait about 10 m. wide. A chain of is.—Texel, Vlieland, Terschelling, Ameland, and Schiermonnikoog—separating it from the N. Sea are the remains of the original coast-line. The Z. Z. was formed in the 13th cent. by the sea breaking through the sand dunes on the coast and flooding the lowlands between it and a small inland lake, with which the floods united. The Z. Z. always remained very shallow, the depth never exceeding 40 ft and being only 3 ft over large areas. It contained sev. is. and received the R. Yssel. In 1918 a law was passed to provide for the reclamation of the Z. Z. to make a new prov., and work was begun in 1923. An enclosing dam (Afsluitdijk, q.v.) was completed in 1932, transforming the Z. Z. into a fresh-water lake, the IJsselmeer. For reclamation of the various polders, see *under* IJSELMEER; also NORTH-EAST POLDER; WIERINGEN; and RECLAMATION.

Zuidholland, see SOUTH HOLLAND.

Zulia, see ADULIS.

Zulia, state of W. Venezuela, bordered on the W. by Colombia. It is well-watered, and has a tropical climate. Maracaibo is the cap. The land under and around the lake of the same name is one of the world's most valuable sources of petroleum. Cocoa, sugar, cotton, and coffee are grown, and there are rich timber reserves. Area 24,360 sq. m.; pop. 560,000.

Zuloaga, Ignacio (1870-1945), Sp. painter, b. Elbar. He went to Rome to study architecture but took to painting instead. He is known for his landscapes, genre subjects, and portraits of women. His work shows the influence of Velazquez, and, particularly in his use of the grotesque, that of Goya.

Zulu War (1879) arose out of Zulu-Boer disputes over the possession of lands on the Transvaal border. When the Transvaal was annexed, Cetewayo (q.v.) undoubtedly expected that the British would do justice to him as he conceived the case, on the subject of the land disputes which had been so bitter a source of contention between him and the Boers. But Shepstone (q.v.), Administrator of Transvaal, eventually decided that the Zulu claim was unfounded, and Sir Bartle Frere, the High Commissioner, was led to agree. He then sent an ultimatum to Cetewayo calling upon him to disband his army, and justified this demand on the ground of the oppressive rule of the Zulus. Cetewayo refused and the British crossed into Zululand in 5 columns under Lord Chelmsford. One of these was promptly cut up at Isandhlwana (q.v.). This defeat was followed by the great epic of Rorke's Drift (q.v.). Louis Napoleon, Prince Imperial of France, who was serving with the Brit. forces, was killed whilst on patrol. The Zulus were finally crushed at Ulundi in 1879. Cetewayo fled, but was captured. See F. W. Chesson, *The War in Zululand: A Review of Bartle Frere's Policy*, 1879; H. Mason, *The Zulu War: Its Causes and its Lessons*, 1879; for Cetewayo's story of the Zulu nation and the war see *Macmillan's Magazine* for Feb. 1880.

Zululand, dist. of S. Africa, since 30 Dec. 1897 integral part of Natal; the NE. coastal region. It includes Tongaland, and is bounded by Vryheid on the W., Swaziland and Mozambique on the N., Natal proper on the S., and the Indian Ocean on the E. and SE. The surface is mainly mountainous, but is much flatter in the NE. It is watered by the Tugela, which for about 100 m. forms its S. boundary, the Blood R., a trib. of the Tugela forming the W. boundary, Umbalusi, Umvolosi, and Mkusi R.s. The Mkusi flows into the large shallow St Lucia Lake, and finds its way to the sea at St Lucia Bay with the Umvolosi R. There are large forests, and the land is very fertile, though in recent years signs of soil erosion and exhaustion have become increasingly apparent. Sugar is the most important product, and is exported in quantity; cereals (especially maize), fruits, and vegetables are grown, as well as beans and cotton. Stock-raising is also carried on. Europeans own only about a quarter of Z.: most of it is crown land, held as native reserves. When Z. was annexed in 1897, with a promise of the preservation of its lands, a Lands Commission was instructed to provide liberally for natives in view of their requirements. In the result, about three-quarters of Z. was formed into reserves and placed under the Zululand

Native Trust. The potential mineral wealth is very great: there are considerable gold deposits in the S., and coal, lead, copper, tin, and silver are also found. The climate is healthy except on the coast, where fever is prevalent, the rainfall averaging about 40 in. per year. Modern science, however, has eliminated the tsetse fly from Z. The flat, swampy coastland is not navigable. The prin. tn is Eshowe. Other townships include Umfolozi, centre of a sugar-cane dist.;



South African Railways
ZULU

Matubatuba, from which there is rail connection with the Pongola riv. valley, through a sugar and cotton dist.; Somkele; Candover; and Nongoma. A railway runs along the coast from Durban to Gollie in the SE. corner of the Transvaal, via the St Lucia coalfield, W. of the St Lucia Lake; otherwise there are no railways in Z. The main roads are good. There are increasing educational facilities, even in remote vils. The leading Christian denominations have churches in Z. Z. is governed by a provincial council and an administrator appointed by the governor-general. Area 10,425 sq. m.; pop. 360,000 (including 6000 Europeans). See also NATAL; SOUTH AFRICA; ZULUS.

Zulus (Amazulus), S. African people belonging to the Bantu stock. Both physically and intellectually they are a fine race. They are advanced in domestic arts. When industrialised, they have proved skilful artisans. The reverential worship of the dead occupies a large place in the religion of the Z. There is an extensive folklore, and the unwritten code

of laws is well observed. Gov. is by chiefs, through the heads of dists. The importance of the nation dates from the beginning of the 19th cent., when it was organised and led through a series of victorious campaigns by the chief Chaka, whose name was feared as far N. as the Zambezi R. He was murdered in 1829 by his half brother Dingaan, who succeeded him. He, too, was a tyrant, and was defeated by the Boers at Blood R., Dec. 1838. The next rulers were Umhanda (d. 1873) and Cetewayo (q.v.),

Zurbaran, Francisco (1598-1662), Sp. painter, b. Fuente de Cantos of peasant extraction. He went to Seville, and in 1625 he was engaged to paint an altarpiece for the cathedral there; while in 1650 he was appointed one of the painters to the king, Philip IV. His 'Franciscan' (National Gallery) is a famous work expressive of sombre devotion. In recent years respect for Z. as a painter has steadily grown, not only for his figures but also for his admirable still-lives. See M. S. Soria, *Zurbaran*, 1955.



Swiss National Tourist Office

ZURICH, SWITZERLAND: RIVER LIMMAT AND GROSSMÜNSTER

during whose reign war broke out with Great Britain. (See ZULU WAR (1879).) Zululand was annexed to Great Britain in 1887, and became part of Natal in 1897. See J. Y. Gibson, *The Story of the Zulus*, 1911; J. Stuart, *History of the Zulu Rebellion*, 1913; I. Evans, *Native Policy in Southern Africa*, 1935; Sir R. Coupland, *Zulu Battle Piece*, 1948.

Zungaria, see DZUNGARIA.

Zuni, a Pueblo tribe of New Mexico. The Spaniards met them in 1539 and wrote glowing accounts of the 'Kingdom of Cibola'; they were later subjugated by the Spaniards. To-day there are some 2000 remaining. They have been well described in the works of Elsie Clewes Parsons, and in R. Benedict, *Patterns of Culture*, 1934. See PUEBLO.

'Zürcher Zeitung,' see 'NEUE ZÜRCHER ZEITUNG.'

Zürich: 1. Canton of NE. Switzerland, bounded on the N. by the Rhine. Its N. part is open and undulating, while the central and S. portions are hilly, with summits rising to 4000 ft. It forms part of the basin of the Rhine, and is also drained by the Töss, Limmat, Thur, Sihl, and Glatt. The greater part of Lake Z. lies within the canton. Much of Switzerland's heavy, electrical, and textile industry is located in the area. Area 667 sq. m.; pop. (1955) 842,000, nearly half of them being engaged in industry; the pop. is increasingly concentrated in the N. parts of the canton. The official language is German; the spoken language is Z. dialect. The majority of the pop. is Protestant.

2. Cap. of the above canton, situated at the exit of the Limmat from Lake Z. It is the largest and most important tn in Switzerland, and the centre of Swiss commercial life. Manufs. include textiles, machinery, chemicals, paper, printing, etc. Tourism is also important, and there are sev. large hotels. Z. Univ. was founded in 1833, the famous Federal Institute of Technology in 1854. The old part of the tn is very picturesque. The Protestant cathedral, or Grossmünster, contains architecture dating from the 11th to the 18th cent. Zwingli (q.v.), a leader in the Protestant movement, was pastor here in the 16th cent. The Fraumünster is a 9th-cent. foundation, and contains some fine 13th-cent. work with some magnificent modern frescoes by Paul Bodmer. The church of St Peter is noted for its baroque; the Rathaus (tn hall, 1694-8) is a Renaissance building. The Central Library contains many old MSS, including letters of 16th-cent. Swiss reformers. One of the magnificent newer buildings is the Swiss National Museum, opened in 1898, containing a large collection of Swiss antiquities and art treasures. Many modern office blocks have been built in the centre of the tn since the end of the War. The trans-continental airport of Z.-Kloten lies to the N. of the tn.

There was a Rom. settlement on the site of Z. in the 1st cent. BC, known as Turicum. In the 5th and 6th cents. the district was occupied by the Alemanni, but it is not named as a tn until the 9th cent. During the Middle Ages Z. was the most important of the Swiss tns. Rudolf Brun (q.v.), the first burgo-master of Z., overthrew the governing nobility, 1336, and divided the power between the patricians and the craft-guilds. The tn joined the Swiss confederation in 1351. Hans Waldmann, another great burgo-master, led the Swiss to victory in the Burgundian war at Morat, 1476, and strengthened the administration of Z. against the dominance of the Church. At the Reformation Z. followed Zwingli's teaching, and became, like Geneva, a city of refuge for the persecuted. In the 18th cent. it was one of the centres of the Ger. literary revival. It then suffered a slight decline in importance, but this tendency was reversed towards the end of the 19th cent., when Z. became a modern industrialised tn and rapidly developed. Pop. (1957) 426,000. See E. Arnet, *The Book of Zürich*, 1954.

Zutphen, tn in the prov. of Gelderland, Netherlands, at the confluence of the IJssel and the Berkel, 18 m. NE. of Arnhem. The Grote Kerk (St Walburgis) is a 12th-cent. foundation. Other interesting buildings are Wijn Huis Tower, and its pre-Reformation library. In the battle of Z., between the English and the Spaniards, 22 Sept. 1586, Sir Philip Sidney (q.v.) was killed. Industries include metalwork, silk manuf., furniture, and printing. Pop. 24,000.

Zuyder Zee, see ZUIDER ZEE.

Zweibrücken, Ger. tn in the Land of Rhineland-Palatinate (q.v.), 65 m. SW. of Mainz (q.v.), formerly cap. of the

ancient duchy of Z. It has a 15th-cent. church and some interesting baroque buildings. Machinery, footwear, and electrical equipment are manuf. The famous printing press was founded in the 18th cent. Pop. 30,000.

Zweig, Arnold (1887-), Ger. novelist, b. Glogau, of Jewish parents. He studied at Munich, Berlin, and Göttingen. Z. served in the Ger. Labour Corps during the First World War. Later he studied for the Bar and practised law, but subsequently devoted himself to writing novels and plays, including *Die Novellen um Claudia*, 1912. In 1923 he settled in Berlin and became known as an enthusiastic Socialist and Zionist and achieved world-wide fame with his novel of the First World War, *Der Streifzug des Sergeanten Grischka*, 1927. In 1933 he was exiled from Germany, and from 1934 resided in Palestine. Other pubs. include: *Die junge Frau von 1914*, 1932, *Einsetzung eines Königs*, 1937, *Das Beil von Wandsbek*, 1947. Z. has also written short stories and essays on literature, politics, and Jewish problems.

Zweig, Stefan (1881-1942), Austrian novelist and biographer, b. Vienna, of Jewish parentage, and educ. in Vienna. He acquired a great European reputation as a writer of short stories and incisive studies of great personalities. He became well known through his translations from the French of Baudelaire, Verhaeren, and Verlaine, which were accompanied by critical essays. In 1920 he pub. *Drei Meister*, essays on Balzac, Dostoevsky, and Dickens, psychological in treatment. His later vols. in this *genre* dwell more on the pathological side of genius, as in his studies of Tolstoy, Nietzsche, Hölderlin, and Kleist. He wrote a number of short stories, technically brilliant but morbid in subject, dealing often with mental derangement and sexual abnormalities, the best, perhaps, being *Amok*, 1923. He gave an unusual interpretation of Mary Stuart and Queen Elizabeth in his *Maria Stuart*, 1935, which might be described as romanticised biography. Forced out of Salzburg by the Nazis, he settled in Britain. His later published work included a novel, *Beware of Pity*, 1939, a striking study of woman's psychology set in Imperial Austria, which ranks among Z.'s finest work. Z. took his own life in Petropolis, Brazil. See his autobiography *Die Welt von Gestern* (trans.), 1943; J. Romain, *Stefan Zweig, Great European*, 1941; life by Friderike Zweig, 1948.

Zwickau, Ger. city in the dist. of Karl-Marx-Stadt, on the Zwickauer Mulde, 20 m. WSW. of Karl-Marx-Stadt (q.v.). It was a free city of the Empire, 1290-1323. During the Reformation the Anabaptist (q.v.) movement spread from here. There are 2 fine Gothic churches (14th and 15th cents.) and a 16th-cent. Rathaus. The dist. has important industries. Pop. 130,000.

Zwingli, Huldreich, or Ulrich (1484-1531), Swiss religious reformer, b. Wildhaus, St Gallen, of peasant extraction;

studied at Bern, Vienna, and Basel. In 1506 he became par. priest at Glarus, and in 1512 and 1515 went on foreign service as chaplain to Swiss mercenaries, for which he received a papal pension. In 1516 he became preacher to the Benedictine monastery at Einsiedeln, where he denounced the pilgrimages to the shrine of the Blessed Virgin there. In 1519 he became preacher at the *Grossmünster*, Zürich. He now began to attack Catholic ceremony and doctrine and declared the Scriptures the sole rule of faith, denying papal authority. Under his influence shrines were desecrated, sacred images destroyed, and all pictures removed from the churches. Z. won over Zürich council in 1523, and in 1525 the Mass was abolished there. Z. declared that the Eucharist was merely symbolic, and on this point he quarrelled with Luther (q.v.). Z. and Luther met at Marburg, only to part as bitter enemies. Z. took an active part in the war between Zürich and the Catholic Forest Cantons and was killed at Cappel, where his party met with a disastrous defeat. His break with traditional beliefs and practices was much more extreme than that of Luther or the Eng. reformers. In many ways Z. anticipated Calvin, as in his views on predestination, and probably Calvin was greatly influenced by Z.'s teaching. The quarrel with Luther ensured that Z.'s ideas would never have much influence in Germany; the defeat at Cappel, and the later rise of Calvinism, limited their influence in Switzerland. See lives and studies by S. Simpson, 1902, and P. Burkhardt, 1918. See also A. Lang, *Zwingli and Calvin*, 1913; W. Hadorn, *Die Reformation in der deutschen Schweiz*, 1928.

Zwinglians, name given to the disciples of the reformer Zwingli, and so to the Reformed Churches of German Switzerland in general. Owing to their controversy with the Lutherans concerning the real presence in the Eucharist, they were also called Sacramentarians. But the name which they themselves assumed was that of Evangelicals, which after a time displaced all others.

Zwolle, cap. of the prov. of Overijssel, Netherlands, on the R. Zwart Water, 40 m. NNE. of Arnhem. The Gothic St Michael's Church has a famous organ. The tn is an important centre of transit trade, and has manufs. of iron, cotton, etc., and shipyards. Near by is Agnietenberg Monastery, the home of Thomas à Kempis (q.v.). Pop. 53,040.

Zygote, fertilised egg cell formed by the fusion of a male gamete (spermatozoon or male sexual cell) with a female gamete (ovum or female sexual cell).

Zymotic. Term used in medicine by certain authorities to designate the class of acute infectious illnesses. It was originally given a much wider application because of the belief that the mode of action of the causative principle was analogous to, if not identical with, the process of fermentation. Its reference is now restricted to the chief acute infectious and contagious disease, e.g. typhoid, typhus, small-pox, diphtheria, cholera, scarlet fever, measles, whooping cough, erysipelas, etc. Because of the theory which it suggests, its use is now becoming increasingly rare.

Zyryanovsk, tn and mining centre in E. Kazakhstan oblast (prov.) of the Kazakh S.S.R. of the Soviet Union. There are zinc, lead, and silver deposits. Pop. 80 000.

APPENDICES

APPENDIX I

ALPHABETICAL ARRANGEMENT

Throughout this encyclopaedia the British Standards Institution's (*see* STANDARDS INSTITUTION, BRITISH) system of alphabetical arrangement has been followed, *see* INDEXING. *See also* *British Standard* booklet No. 1749: 1951, *Alphabetical Arrangement*.

For the convenience of the reader examples of the system as applied to some difficult or complex cases in this particular work are given below.

'Nothing-before-something'

The 'nothing-before-something' principle: for example, ARABI PASHA precedes ARABIA although the sixth letters are not in alphabetical order.

Entries divided by a comma

When a comma occurs in an entry any words after the comma are disregarded and the entry is arranged as if it consisted only of the word or words before the comma.

LAND
LAND, NATIONALISATION OF
LAND ARMY
LAND BANKS

RAM
RAM, THE
RAM MOHAN ROY

Names beginning with an article or preposition

Proper names beginning with an article or a preposition are exceptions to the 'nothing-before-something' rule and are treated as one word.

LAEVULOSE
LA FARINA, GIUSEPPE
LA FAYETTE, GILBERT MOTIER DE
LA FAYETTE, MARIE JOSEPH
LAFAYETTE (city)
'LAFAYETTE' (Fr. liner)
LA FERTÉ
LAFFITE, JEAN
LA FOLLETTE, ROBERT MARION
LA FONTAINE, JEAN DE
LAFONTAINE, SIR LOUIS HYPPOLYTE

DELANY, PATRICK
DE LA POLE
DE LA RAMÉE, LOUISE
DELAHEY, JACOBUS HERKLASS

Hyphenated entries

If the word before a hyphen is not part of a name or a prefix, but a separate word in its own right, the entry is to be considered as two separate words.

RAIN AND RAINFALL	}	<i>but</i>	{	CHLOROFORM
RAIN-GAUGE				CHLORO-NITROUS GAS
RAIN-MAKING				CHLOROPAL
RAINBOW CORNER				CHLOROPHYLL
HORN	}		{	LAOIGHIS
HORN-FLY				LAO-KAY
HORN-SILVER				LAOMEDON
HORNBEAM				

People, places, and things

When several entries begin with the same word the order is (1) people, (2) places, (3) things. Titles of precedence are disregarded for the purpose of alphabetisation.

BERRY, SIR EDWARD
 BERRY, JAMES
 BERRY, SIR JOHN
 BERRY, MARY
 BERRY, WILLIAM EWART
 BERRY (province of central France)
 BERRY (fruit)

Christian name and surname

A main entry consisting of a christian name, e.g. the name of a saint, precedes the same word used as a surname.

GEORGE, ST.
 GEORGE I, KING OF GREAT BRITAIN AND IRELAND
 GEORGE II, KING OF GREAT BRITAIN AND IRELAND
 GEORGE III, KING OF GREAT BRITAIN AND IRELAND
 GEORGE IV, KING OF GREAT BRITAIN AND IRELAND
 GEORGE V, KING OF GREAT BRITAIN, IRELAND, AND BRIT. DOMINIONS BEYOND THE SEAS, EMPEROR OF INDIA
 GEORGE VI, KING OF GREAT BRITAIN, IRELAND, AND BRIT. DOMINIONS BEYOND THE SEAS
 GEORGE I, KING OF THE HELLENES
 GEORGE II, KING OF THE HELLENES
 GEORGE V, KING OF HANOVER
 GEORGE, D. LLOYD
 GEORGE, SIR ERNEST

Kings, emperors, and other rulers

Rulers having the same name are arranged in chronological order. *But* the earliest king of all is followed by his successors in that country or empire; these are followed by the next earliest king, whatever the country, with all his successors, etc.

CHARLES I (c. AD 742-814), EMPEROR OF THE WEST, KING OF THE FRANKS
 CHARLES II, THE BALD (823-77), HOLY ROMAN EMPEROR
 CHARLES III, THE FAT (832-88), EMPEROR OF THE ROMANS, KING OF THE FRANKS

CHARLES IV (1316-78), HOLY ROMAN EMPEROR
CHARLES V (1500-58), HOLY ROMAN EMPEROR
CHARLES VI (1685-1740), HOLY ROMAN EMPEROR
CHARLES VII (1697-1745), HOLY ROMAN EMPEROR
CHARLES III, THE SIMPLE (879-929), KING OF FRANCE
CHARLES IV, THE FAIR (1294-1328), KING OF FRANCE
CHARLES V (1337-80), KING OF FRANCE
CHARLES VI (1368-1422), KING OF FRANCE
CHARLES VII (1403-61), KING OF FRANCE
CHARLES VIII (1470-98), KING OF FRANCE
CHARLES IX (1550-74), KING OF FRANCE
CHARLES X (1757-1836), KING OF FRANCE
CHARLES VII (*d.* 1167), KING OF SWEDEN
CHARLES VIII (*d.* 1470), FIRST ELECTED KING OF SWEDEN
CHARLES IX (1550-1611), KING OF SWEDEN
CHARLES X (1622-60), KING OF SWEDEN
CHARLES XI (1655-97), KING OF SWEDEN
CHARLES XII (1682-1718), KING OF SWEDEN
CHARLES XIII (1748-1818), KING OF SWEDEN
CHARLES XIV (1763-1844), KING OF SWEDEN
CHARLES XV (1826-72), KING OF SWEDEN
CHARLES I (1226-85), KING OF NAPLES
CHARLES I (1600-49), KING OF GREAT BRITAIN
CHARLES II (1630-85), KING OF GREAT BRITAIN
CHARLES II (1661-1700), KING OF SPAIN
CHARLES III (1716-88), KING OF SPAIN
CHARLES IV (1748-1819), KING OF SPAIN
CHARLES I (KARL FRANZ JOSEF) (1887-1922), LAST EMPEROR OF AUSTRIA-HUNGARY

APPENDIX II

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ING
ACCUMULATOR, ELEC-
TRIC
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ACROBAT
ACT
ACTUARY
ADAM
ADDISON, JOSEPH
ADDRESS, FORMS OF
ADENAUER, KONRAD
ADHESIVES
ADMIRALTY
ADULT EDUCATION
ADVERTISEMENT
ADVERTISING RESEARCH
AEGEAN CIVILISATION
AERIAL WARFARE
AERODYNAMICS
AERO-ENGINES
AERONAUTICS
AEROPLANE
AEROTHERAPEUTICS
AETHER
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AVIATION
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BLOCKADE
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BOLSHEVISM
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BRAIN
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CALIPH
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